THE MARINE REVIEW

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SHIP BUILDING ON THE LAKES

The ship yards of the great lakes have forty-two vessels under construction for 1908 delivery, including twenty-six bulk freighters, two passenger boats, two package freighters, two fireboats, two dredges, one car ferry, one fuel lighter, one lightship, one tug, one sandsucker and three hopper barges. Of this program the American Ship Building Co. is building twenty, the Great Lakes Engineering Works nine, the Toledo Ship Building Co. two, the Manitowoc Dry Dock Co. three, the Racine Boat Manufacturing Co. two, the Polson Iron Works three and the Collingwood Ship Building Co. three. Of the twenty-six bulk freighters the American Ship Building Co. is building seventeen, the Great Lakes Engineering Works seven and the Toledo Ship Building Co. two. This list includes the Caldera, which was launched on Saturday last at the Bay City yard of the American Ship Building Co., and the Kopp, which was launched a couple of weeks ago at the Ecorse yard of the Great Lakes Engineering Works. With the exception of the B. F. Berry, building at the Lorain yard of the American Ship Building Co., and which will be launched in a week or two, the Caldera and Kopp are the only two vessels intended for 1907 delivery which are figured in the 1908 ship building table in this issue. The American Ship Building Co. of course is rebuilding the City of Cleveland, which would have been delivered in June, 1907, had it not been for the fire. The program of the Great Lakes Engineering Works includes the two package freighters building for the Rutland Transit Co., which figures in last year's program. Omitting the Caldera and the Kopp, whose carrying capacity is figured in the lake launchings of 1907, published elsewhere in this issue, the remaining twenty-four bulk freighters for 1908 delivery have a carrying capacity of 204,700 tons on a single trip, or 4,094,000 tons in an average season of twenty trips.

It will be observed in the launching table published elsewhere that forty bulk freighters were put overboard in 1907, having a carrying capacity of 368,000 gross tons on a single trip, or 7,220,000 tons in an average season of twenty trips. In the past six years vessels having a gross carrying capacity of 29,773,200 tons in a full season have been added to the lake fleet. The 1908 program will increase this to 33,867,200 tons, which is greater than the total movement of ore in any one year up to 1905. It is interesting to observe that with the exception of the Tonawanda Iron & Steel Co., none of the great ore-producing and steel-making companies figure in the 1908 program. The vessels are all building for independent interests. There is noted also a decided preference for the 8,000 and 9,000-ton ship, only six in the lot being larger than this.

In addition to this excellent program of new construction the ship yards have an unusual variety of repair work on hand, much of it very extensive. The largest repair job is on the steamer Wm. E. Reis, as described

in this issue of the REVIEW. She was sunk in collision in the St. Clair river, and her repair bill will exceed $100,000. Almost as extensive are the repairs upon the steamer John W. Moore, which was abandoned to the underwriters as a constructive total loss. Repair work will figure especially in the activity of the Toledo Ship Building Co. Last winter this company was very busy with repair work, but this winter it will be twice as busy and will have all that it can possibly do to deliver the vessels by the time navigation opens. This yard has been especially designed for rapidity and economy in repair work. Twenty-two vessels are now awaiting repairs at the yard, fourteen of which will have to be dry docked.

The ship yards on the great lakes did a tremendous amount of work in 1907 under most adverse circumstances, being harassed by labor troubles necessitating the closing down of some of the yards altogether and the operation of the rest of them under reduced forces. Work is being gradually resumed now, however, though the yards are not as yet in full operation. Considering this great handicap it was a prodigious thing to put fifty-six vessels into the water, forty bulk freighters, three package freighters, one passenger steamer, one wrecker, one lighter, one mailboat, five tugs and four scows.

VESSELS UNDER CONSTRUCTION IN GREAT LAKES SHIP YARDS FOR 1907 DELIVERY.

AMERICAN SHIP BUILDING CO.'S YARDS.

To be built at	Type or Name	Dimensions in ft. Over all	Keel	Beam	Depth	No. of Hatches	Spaced Centers, ft.	Dimensions of Engines	Boilers, dimensions in feet and inches	Draft	Steam Pressure, Pounds	Capacity, Gross Tons	For whom building
Lorain	Bulk Ftr.	452	432	52	28	....		22, 35, 58-42.	13.9x11.6	Ellis & Eaves	170	8,000	J. J. H. Brown & Co., Buffalo
Lorain	Bulk Ftr.	524	504	54	31	30	12	22½, 36, 60-42.	13.9x11.6	Ellis & Eaves	180	9,000	Jenkins Steamship Co., Cleveland
Wyandotte	Bulk Ftr.	440	420	52	28	12	24	22, 35, 58-42.	13.9x11.6	Ellis & Eaves	170	7,500	Edward Mehl, Erie Pa.
Cleveland	Bulk Ftr.	524	504	54	30	30	12	23, 38, 63-42	14.6x11.6	Ellis & Eaves	180	9,000	Wilson Transit Co., Cleveland
Bay City	A. W. Thompson	524	504	55	30	30	12	23½, 38, 63-42.	14.6x11.6	Ellis & Eaves	180	9,000	W. H. Becker, Cleveland
Cleveland	Bulk Ftr.	500	480	54	30	14	24	22½, 36, 60-42.	13.9x11.6	Ellis & Eaves	180	9,000	W. C. Richardson, Cleveland [Hanna Transit Co.]
Lorain	Bulk Ftr.	452	432	52	28	23	12	22, 35, 58-42	13.9x11.6	Ellis & Eaves	170	9,000	Harvey L. Brown, Buffalo
Lorain	Bulk Ftr	400	380	50	28	20	12	20, 33, 55-40	13.9x12.	Natural	180	7 000	W. H Becker, Cleveland
Buffalo	Pass. Str.	215	200	45	16	...	...	20, 32, 50 35	13.2x11.6	Ellis & Eaves	180	3,500	Lake Erie Excursion Co., Buffalo
Lorain	Bulk Ftr.	452	432	52	28	23	12	22, 35, 58-42	13.9x11.6	Ellis & Eaves	180	Pgrs.	Chas L Hutchinson, Cleveland
Buffalo	Bulk Ftr.	257	237	41	19	6	24	E of Wkd. S. Panama	11x11	Howden	160	7,500	James Davidson, Bay City, Mich.
West Superior	Bulk Ftr.	440	420	52	28	12	24	22, 35, 58-42	13.9x11.6	Ellis & Eaves	180	7,500	R. P. Ranney, Cleveland
West Superior	Bulk Ftr.	452	432	52	28	23	12	22, 35, 58-42	13.9x11.6	Ellis & Eaves	170	2,2	H. S. Wilkinson, Syracuse, N. Y.
Bay City	Bulk Ftr.	552	532	56	31	32	12	23½, 38, 63-42.	14.6x11.6	Ellis & Eaves	180	7,500	W. A. & A. H. Hawgood, Cleveland
Lorain	Bulk Ftr.	452	432	52	28	12	24	22, 35, 58-42	13.9x11.6	Ellis & Eaves	180	10,000	J. J. Rardon, Buffalo
Wyandotte	Bulk Ftr.	545	525	55	31	32	12	23½, 38, 63-42.	14.6x11.6	Ellis & Eaves	180	10,000	H. S. Wilkinson, Syracuse, N. Y.
Cleveland	.....	170	165	44	12	....	..	No Propelling	Donkey Boiler	Natural		8,000	Mr, Saunders
Detroit	Pass. Str. City of Cleveland	402	390	54	22	....	...	54, 82, 82-96.	13.9x12	Howden	160	.....	Detroit & Cleveland Steam Navigation Co., Detroit, Mich.
Bay City	Caldera	524	504	54	30	30	12	22½, 36, 60-42	13.9x11.6	Ellis & Eaves	180	9,000	S. B. Cranage, Bay City, Mich.
Lorain	P. F. Berry	569	549	56	31	34	12	24, 39, 65-42	15.4x11.6	Ellis & Eaves	180	10,000	H. K. Oakes, Detroit, Mich.

GREAT LAKES ENGINEERING WORKS, DETROIT, MICH.

Ecorse	Pkg. Fr'tr.	256	244	43	26.6	6	24	16¾, 24, 35, 51-36	12.2x11.3	Gt. Lakes h'td.	210	3,000	Rutland Transit Co., Buffalo, N. Y.
Ecorse	Pkg. Fr'tr.	256	244	43	26.6	6	24	16¾, 24, 35, 51-36	12.2x11.3	Gt. Lakes h'td.	210	3,000	Rutland Transit Co., Buffalo, N. Y.
Ecorse	Freighter.	480	460	52	30	13	24	21½, 35, 58-42,	13.3x11.6	Gt. Lakes h'td	180	8,000	M. A. Bradley, Cleveland, O.
Ecorse	Freighter.	557	533	58	31	30	12	24, 38, 65-42.	16x11.8	Gt. Lakes h'td.	180	10,500	Mutual Steamship Co., G. A. Tomlinson Mgr., Duluth, Minn.
Ecorse	Freighter.	557	532	58	31	30	12	24, 38, 65-42.	16x11.8	Gt. Lakes h'td.	180	10,500	Mutual Steamship Co., G. A. Tomlinson Mgr., Duluth, Minn.
St. Clair	Freighter	440	420	52	28	12	24	21, 31½, 57-42	13x11.6	Gt. Lakes h'td.	180	7,500	Ashtabula S. S. Co., Ashtabula, Ohio
Ecorse	Freighter.	550	530	53	31	32	12	23, 37, 63-42.	15x11.6	Gt. Lakes h'td	180	10,000	Frontier Steamship Co., Wm. M. Mills, Mgr., Tonawanda, N. Y.
Ecorse	Freighter.	550	530	56	31	32	12	23, 37, 63-42	15x11.6	Gt. Lakes h'td	180	10,000	Frontier Steamship Co., Wm. M. Mills, Mgr. Tonawanda, N. Y.
Ecorse	J. C. Kopp	500	480	54	30	14	24	22½, 36, 60-42	13.9x11.6	Gt. Lakes h'td	180	8,500	Pennsylvania Steamship Co., York, Pa

TOLEDO SHIP BUILDING CO., TOLEDO, O.

Toledo	Bulk Freighter	524	504	58	30	15	24	20, 29, 42, 61-42	3-12.6x11.10¼	Forced	210	9,000	Jas. E. Davidson, Bay City, Mich. G. A. Tomlinson, Duluth, Minn. (M.S.S.Co.)
Toledo	Bulk Freighter	524	504	58	30	15	24	20, 29, 42, 61-42	3-12.6x11.10¼	Forced	210	9,000	H. S. Wilkinson & L. C. Smith, Syracuse, N. Y

COLLINGWOOD SHIP BUILDING CO., LTD., COLLINGWOOD, ONT.

.....	Steel Hopper Barge	102	....	28.3	9.0	hs. 5	....	.....	.....	.....	....	300 cu.yds.	C. S. Boone Dredging Co., Toronto, Ont.
.....	Steel Hopper Barge	122	....	32.0	11.0	6	....	Steam Operating Gear	.....	.....	....	450 cu.yds.	Owen Sound Dredging & Construction Co., Ltd., Owen Sound, Ont.
.....	Steel Hopper Barge	122	....	.....	.....	.....	.....	Steam Operating Gear	.....	.....	....	450 cu.yds.	Owen Sound Dredging & Construction Co., Ltd., Owen Sound, Ont.

MANITOWOC DRY DOCK CO., MANITOWOC, WIS

.....	Steel Stm. Sandskr.	151	145	38	10	....	....	16, 34-26	Sco ch, 11.6x13	.....	140	450	Western Sand Co., South Chicago, Ill.
.....	Fireboat	120	110	28	15	....	....	Two Electric Motors, generat'd by Turbines	Two Scotch, 12.6x11.6	.....	170	250	City of Chicago.
.....	Fireboat	120	110	28	15	....	....	Two Electric Motors generat'd by Turbines	Two Scotch, 12.6x11 6	.....	170	250	City of Chicago.

RACINE BOAT MANUFACTURING CO., MUSKEGON, MICH.

.....	Steel Lightship	83.3	82.0	21	10.6	....	....	Single Cyl. 14"x14"	Fire Box 5 0dia.x9 3 lgh.	.....	120	140	U. S. Lighthouse Establishment.
.....	Steel Tug Essayons	85.6	77.7	21	11.6	...	....	16, 34-26	Fire Box 8.0dia.x14.0lgh	....	180	175	U. S Engineers, Duluth, Minn.

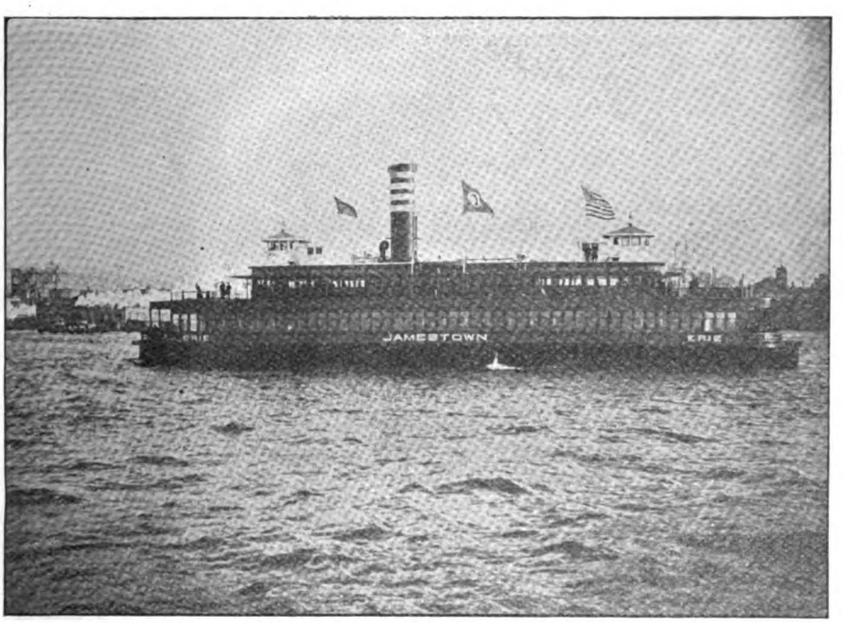
POLSON IRON WORKS, TORONTO.

Toronto.....	5 cu. yd Dip'r Drg. (Steel)	110	....	38.0	11.6 10.6	....	....	Double 14"x16"	10.0x10.6	Natural	150	300	Dominion Government, Ottawa, Can
Toronto.....	City Dredge No. 3	110	....	30.0	7.8	....	....	8¼, 13½, 22-16	10.0x12	Natural	160	250	City of Toronto.
Toronto.....	*Car Ferry Chas. Lyon	280	248	40.0	22	....	....	Two 22, 42-30	Four Scotch 11.4x11.4	Howden	130	1800	David H. Lyon, Ogdensburg, N. Y.

*Launched.

FERRYBOAT JAMESTOWN FOR ERIE RAILROAD.

The ferryboat Jamestown, launched at the yards of the Burlee Dry Dock Co., Staten Island, on Sept. 26, is the fifth new addition to the fleet of the Erie railroad within the past two years, and is believed by her builders to be the fastest boat of her size and type in New York harbor. Her length over all is 224 ft.; beam, 64 ft.; the hull being of steel, with 7 watertight compartments. She is finished throughout in quartered oak, with seats for 1,100 persons and a carrying capacity of 2,500.



FERRYBOAT JAMESTOWN, ERIE RAILROAD CO.

Her propelling machinery consists of two compound engines with cylinders 18 and 38 in. in diameter, driving propellers of 9 ft. 3 in. diameter, with four blades. There are two Scotch boilers 12 ft. 9 in. diameter, each with three corrugated furnaces of 41 in. diameter. She will indicate 1,600 H. P.

Steel is used in the superstructure, two longitudinal trusses running the entire length of the vessel and separating her into the usual two-cabin and runway type of ferry. As all other portions of the superstructure with the exception of the windows and cabin fittings are also of steel, the danger from fire is reduced to the minimum. The Jamestown is lighted by electricity, heated by the indirect hot air system, provided with steel lifeboats and rafts and every modern appliance that pertains to the safety and comfort necessary in a ferryboat of that type.

The ship building enterprise of which W. H. Reed is manager, which has been conducted at Portland, Me., will be transferred to the city of Freeport, where it is planned to construct a four-masted schooner shortly. The company launched the four-masted schooner Victory last summer.

STEAMER ISTHMIAN LAUNCHED.

The freight steamship Isthmian was launched on Saturday, Dec. 21, at the yard of the Union Iron Works, San Francisco, the traditional bottle of champagne being broken on her bow by Margaret E. Tynan, the 8-year-old daughter of J. J. Tynan, the general manager of the works. The little girl received a small gold watch and locket as a souvenir of the occasion. The keel of the Isthmian was laid early in 1907 and the finished vessel will be ready for delivery to the American-Hawaiian Steamship Co. some time between Feb. 15 and March 1, of this year. She is to carry American and Hawaiian freight between New York and the Hawaiian Islands, proceeding from New York to Coatzacoalcos on the Gulf of Mexico, where the freight will be transferred to the Tehuantepec railroad, which will carry it to Salina Cruz on the Pacific coast. The length of the Isthmian is 385 ft. on the water-line, her breadth is 50 ft. and her depth 28½ feet; her displacement being 12,000 tons and her speed 11 knots.

Among those who witnessed the ceremony of the christening and the launching were John A. McGregor, president of the Union Iron Works; Mrs. McGregor, Miss Kitty Belle McGregor, Mr. and Mrs. J. J. Tynan, Miss Vesta Reade, Miss Helen Bertheau, Miss McCraney, Miss Montague; H. P. Frear, naval architect of the Union Iron Works; A. W. Cook, manager of the American-Hawaiian Steamship Co.; Arnold Foster, treasurer of the Union Iron Works; Dr. O'Neill, Mr. and Mrs. Mark P. Guerrine, Mr. and Mrs. Kochsperger, W. H. Stewart, Mr. Sutton, of Williams, Dimond & Co.; Mr. Kennedy and Mr. Johnson, of the Inter-Island Steam Navigation Co.

UNITED STATES NAVAL PROGRAM

There are at present 29 ships building for the United States navy as against 22 a year ago. During the year the following warships have gone into commission: Battleships, Nebraska, Vermont, Kansas and Minnesota; armored cruisers, California and South Dakota; protected cruisers, Milwaukee; training ship, Cumberland, and submarines, Viper, Cuttlefish and Tarantula. The 29 ships now under construction embrace seven battleships, two armored cruisers, three scout cruisers, eight submarines, five destroyers, two colliers and two tugs. Omitting the submarines, these ships represent a displacement of 155,430 tons, a horsepower of 285,870, and a monetary value, exclusive of armor and armament, of $40,699,000. The important additions to the naval program during the year have been the battleships North Dakota and Delaware which are to be the Dreadnaughts of the American navy, five torpedo boat destroyers, seven submarines, two colliers and two tugs. The two battleships are to be of 20,000 tons displacement, the Delaware, building by the Newport News Ship Building & Dry Dock Co., to be equipped with triple-expansion engines, and the North Dakota, building by the Fore River Ship Building Co. to have Curtis turbines. The five destroyers are also to be equipped with turbine machinery. With the scout cruisers Chester and Salem these vessels will represent the American naval contribution to the development of the turbine.

The coast ship yards are fairly busy with merchant work but exclusively for the coastwise trade. There is some reason to believe, however, that congress will at the present session do something for its merchant marine in the foreign trade. Senator Gallinger has introduced a bill to extend the provisions of the ocean mail act of 1891 to vessels of the second class, meaning vessels of 16 knots speed. The passage of this measure would result in the projection of mail lines to quarters not now visited by American mail steamers and would sensibly stimulate ship building in United States yards. There is noted throughout the country a more kindly feeling towards the American merchant marine from interests hitherto hostile. In fact the cruise of the Atlantic naval squadron to the Pacific ocean has rather awakened the patriotism of the American people upon the subject, as this squadron is accompanied by a fleet of 29 foreign colliers and one lone American collier. This is a position of such grave danger as to be potential of most direful consequences.

Vessels Under Construction for the United States Navy.

Name.	By whom and where building.	Contract date of completion.	Dimensions. ft., in. Normal condition. Length between perpendiculars.	Breadth on L. W. L.	Mean draught	Displacement (normal).	I. H. P. (estimated.)	Speed, knots (estimated).	Type of engine.	Type of boilers.	Contract price of hull and machinery.
Battleships.											
Mississippi	Cramp & Sons, Philadelphia	Mar. 25, 1907	375	77	24 8	13,000	10,000	17	Trip.exp., twin screw	Bab. & Wil.	$2,999,500
Idaho	Cramp & Sons, Philadelphia	May 25, 1907	375	77	24 8	13,000	10,000	17	Trip.exp., twin screw	Bab. & Wil.	2,999,500
New Hampshire	New York S. B. Co., Camden, N. J.	Feb 27, 1908	450	76 10	24 6	16,000	16,500	18	Trip.exp., twin screw	Bab. & Wil.	3,748,000
South Carolina	Cramp & Sons, Philadelphia, Pa.	Dec. 21, 1909	450	80 2½	24 6	16,000	16,500	18½	Trip.exp., twin screw	Bab. & Wil.	3,540,000
Michigan	New York S. B. Co., Camden, N. J.	Nov. 20, 1909	450	80 2½	24 6	16,000	16,500	18½	Trip.exp., twin screw	Bab. & Wil.	3,585,000
Delaware	Newport News Co., Newport News	Aug. 6, 1910	510	85 2½	26 11	20,000	25,000	21	Trip.exp., twin screw	Water tube	2,987,000
North Dakota	Fore River Co., Quincy, Mass.	June 21, 1910	510	85 2¾	26 11	20,000	25,000	21	Twin screw, turbine	Water tube	4,377,000
Armored Cruisers.											
North Carolina	Newport News Co., Newport News	Jan. 3, 1908	502	72 10½	25	14,500	23,000	22	Trip.exp., twin screw	Bab. & Wil.	3,575,000
Montana	Newport News Co., Newport News	Jan. 3, 1908	502	72 10½	25	14,500	23,000	22	Trip.exp., twin screw	Bab. & Wil.	3,575,000
Scout Cruisers.											
Chester	Bath Iron Works	May 4, 1908	420	47	16 9	3,750	16,000	24	Four screw, turbine	Normand	1,688,000
Birmingham	Fore River Ship Bldg. Co	Nov. 17, 1907	420	47	16 9	3,750	16,000	24	Twin screw, trip exp.	Express	1,556,000
Salem	Fore River Ship Bldg. Co	Mar. 17, 1908	420	47	16 9	3,750	16,000	24	Twin screw, turbine	Fore River	1,556,000
Torpedo Boat Destroyers.											
T. B. Des. No. 17	Cramp & Sons Philadelphia	Oct. 10, 1909	289	26	8	700	10,000	28	Three screw, turb.	Water tube	585,000
T. B. Drs. No. 18	Cramp & Sons, Philadelphia	Oct. 10, 1909	286	26	8	700	10,000	28	Three screw, turb.	Water tube	585,000
T. B. Des. No. 19	New York S. B. Co., Camden, N. J.	Sep. 28, 1909	280	26	8	700	10,000	28	Three screw, turb.	Water tube	645,000
T. B. Des. No. 20	Bath Iron Works	Sep. 28, 1909	284	26	8	700	10,000	28	Three screw, turb.	Water tube	624,000
T. B. Des. No. 21	Bath Iron Works	Sep. 28, 1909	289	26	8	700	10,000	28	Three screw, turb.	Water tube	624,000
Submarines.											
Octopus	Fore River Ship Bl'g. Co										
Submarine No. 13	Fore River Ship Bldg. Co										
Submarine No. 14	Fore River Ship Bldg. Co										
Submarine No. 15	Fore River Ship Bldg. Co										
Submarine No. 16	Fore River Ship Bldg. Co										
Submarine No. 17	Fore River Ship Bldg. Co										
Submarine No. 18	Fore River Ship Bldg. Co										
Submarine No. 19	Fore River Ship Bldg. Co										
Colliers.											
Vestal	Navy Yard, New York		450	60 1	26	12,585	7,500	16	Trip.exp., twin screw	Bab. & Wil.	a 1,550,000
Prometheus	Navy Yard, Mare Island		450	60 1	26	12,585	7,500	16	Trip.exp., twin screw	Bab. & Wil.	a 1,550,000
Tug Boats.											
Patapsco	Navy Yard, Portsmouth		148	29 0½	12 3	755	1,160	13	Trip.exp., twin screw	Scotch.	a 175,000
Patuxent	Navy Yard, Norfolk		148	29 0½	12 3	755	1,160	13	Trip.exp., twin screw	Scotch.	a 175,000

a Limit of cost.

MERCHANT WORK IN COAST YARDS

Newport News Ship Building & Dry Dock Co., Newport News, Va.:

Steel freight and passenger steamship Lurline for the Matson Navigation Co., San Francisco, Cal.; length over all, 420 ft.; estimated gross tonnage, 6,200; single screw, triple expansion engines of 3,500 H. P.; four Scotch boilers.

Steel oil tank steamship Texas for the Texas Oil Co., New York; length over all, 410 ft.; estimated gross tonnage, 5,000; single screw, triple expansion engines of 2,800 H. P.; three Scotch boilers.

Steel tug Corning for the D. L. & W. R. R. Co., New York; length over all, 100 ft.; estimated gross tonnage, 180; single screw, compound engine of 600 H. P.; one Scotch boiler.

Steel tug Bath for the D. L. & W. R. R. Co., New York; length over all, 100 ft.; estimated gross tonnage, 180; single screw, compound engine of 600 H. P.; one Scotch boiler.

Steel derelict destroyer for the U. S. Revenue Cutter Service; length over all, 204 ft.; estimated gross tonnage, 1,000; single screw, triple expansion engine of 1,500 H. P.; two Scotch boilers.

Steel suction dredge for U. S. Army Engineer Corps, Philadelphia, Pa.; length over all, 180 ft.; estimated gross tonnage, 1,000; single screw, compound engine of 900 H. P.; two Scotch boilers.

Twelve steel barges for the Isthmian canal commission; length over all, 156 ft.; displacement, 875 tons; no machinery.

Six steel barges for the Isthmian canal commission; length over all, 127 ft.; displacement, 900 tons; no machinery.

Steel bay steamer for the Norfolk & Washington Steamboat Co., Washington, D. C.; length over all, 305 ft.; estimated gross tonnage, 2,000; single screw, triple expansion engine of 3,000 H. P.; four Scotch boilers.

Steel revenue cutter for the U. S. Revenue Cutter Service; length over all, 152 ft.; estimated gross tonnage, 410; single screw, triple expansion engine of 1,000 H. P.; two water tube boilers.

Steel lumber steamer Nann Smith for C. A. Smith Timber Co., Minneapolis, Minn.; length over all, 296 ft.; estimated gross tonnage, 2,100; single screw, triple expansion engine of 1,350 H. P.; two Scotch boilers.

Steel lumber steamer George W. Fenwick for the Hammond Lumber Co., New York; length over all, 296 ft.; estimated gross tonnage, 2,100; single screw, triple expansion engine of 1,350 H. P.; two Scotch boilers.

New York Ship Building Co., Camden, N. J.:

Light vessel No. 88 for the U. S. Government Lighthouse Board; length over all, 129 ft.; approximate value, $99,000; estimated gross tonnage, 488; one vertical compound engine of 380 H. P.; two boilers of gunboat type.

Oil tanker Oklahoma for the J. M. Guffey Petroleum Co.; length over all, 441 ft.; approximate value, $775,000; estimated gross tonnage, 5,800; one triple expansion single screw engine of 3,300 H. P.; three single-ended Scotch boilers.

Eight lighthouse tenders for the U. S. Government Lighthouse Board; length over all, 190 ft.; approximate value, $164,000; esimated gross tonnage, 550; two vertical triple expansion engines of 1,020 H. P.; two cylindrical boilers of the Scotch type. These vessels are named Manzanita, Tulip, Cypress, Sequoia, Kukui, Orchid, Hibiscus and Anemone.

Revenue cutter No. 20 for the U. S. Government Revenue Cutter Service; length over all, 192 ft.; approximate value, $173,000; estimated gross tonnage, 650; three-cylinder, triple expansion, single-screw engine of 1,400 H. P.; two Babcock & Wilson water tube boilers.

Revenue Cutter No. 21 for the U. S. Government Revenue Cutter Service; length over all, 192 ft.; approximate value, $173,000; estimated gross tonnage, 650; three cylinder, triple expansion, single screw engine of 1,400 H. P.; two Babcock & Wilcox water tube boilers.

William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.:

Side wheel steamer, Commonwealth, for the New England Steamship Co., New York; length over all, 438 ft.; estimated gross tonnage, 6,000; compound inclined engines of 11,000 H. P.; 10 single ended Scotch boilers.

Single screw steamer for the Clyde Steamboat Co., New York; length over all, 379 ft.; three-cylinder, triple expansion engines of 3,000 H. P.; four single ended Scotch boilers.

Four main boilers and one donkey boiler for the steamship El Dorado, owned by the Southern Pacific Steamship Co., New York.

Four main boilers and one donkey boiler for the Southern Pacific steamer, El Paso.

Four main boilers and one donkey boiler for the Southern Pacific steamer, El Monte.

Four boilers for the steamship New Hampshire, owned by the New England Steamship Co., New Haven, Conn.

The Moran Co., Seattle, Wash.:

Steel hull steam trawler Chicago for A. Booth & Co., Chicago; length over all, 150 ft.; estimated gross tonnage, 443.2; triple-expansion single screw engine, 600 H. P.; one single-ended Scotch boiler.

Steel hull steam freighter Stanley for the Robert Dollar Co., San Francisco, Cal.; length over all, 250 ft.; estimated gross tonnage, 1,730; triple expansion single screw engine, 850 H. P.; two single ended Scotch boilers and one donkey boiler.

Steel hull steam freighter Riverside for the Charles Nelson Co., San Francisco, Cal.; length over all, 250 ft.; estimated gross tonnage, 1,730; triple expansion single screw engine, 850 H. P.; two single ended Scotch boilers.

One steel hull steam freighter for Schubach & Hamilton, Seattle, Wash.; length over all, 250 ft.; estimated gross tonnage, 1,730; triple expansion single screw engine, 850 H. P.; two single ended Scotch boilers.

Steel fire tug Ajax for the Southern Pacific R. R. Co., San Francisco, Cal.; length over all, 110 ft.; estimated gross tonnage, 255.5; triple expansion single screw engine, 600 H. P.; one Babcock & Wilcox water tube boiler.

Steel freight and passenger steamer Northland for the Ketchikan Steamship Co., Ketchikan, Alaska; length over all, 147 ft. 6 in.; estimated gross tonnage, 456.7; triple expansion single screw engine, 350 H. P.; one single ended Scotch boiler and one donkey boiler.

Steel freight steamer Siskiyou for E. K. Wood Lumber Co., San Francisco, Cal.; length over all, 250 ft.; estimated gross tonnage, 1,730; triple expansion single screw engine, 850 H. P.; two single ended Scotch boilers and one donkey boiler.

Union Iron Works, San Francisco, Cal.:

Steel steamer Mauna Kea for the Inter Island Navigation Co.; length

over all, 251 ft. 6 in.; estimated gross tonnage, 1,549; one triple expansion, 2,200 H. P; single screw; two single ended Scotch boilers.

Steel steamship Isthmian for the American-Hawaiian Steamship Co.; length over all, 398 ft.; estimated gross tonnage, 5,224; one triple expansion single screw engine of 2,750 H. P.; three single ended Scotch boilers.

Steel twin screw steamer Contra Costa for the Standard Oil Co.; length over all, 198 ft.; estimated gross tonnage, 700; two gasoline engines of 500 H. P.

One triple expansion engine for the lumber steamer Willapa for Sudden & Christensen; 11½, 19 and 32 by 24, 500 H. P.; one Scotch boiler.

One triple expansion engine for lumber steamer Doris for A. L. Kruse; 11½, 19 and 32 by 24, 500 H. P.; one Scotch boiler.

One compound engine for lumber steamer San Jacinto, for E. K. Wood Lumber Co.; 14 and 32 by 24, 450 H. P.; one Scotch boiler.

One triple expansion engine for the lumber steamer Shasta for the E. K. Wood Lumber Co.; 12½, 20½ and 34 by 24, 550 H. P.; one Scotch boiler.

Gas Engine & Power Co. & Charles L. Seabury & Co., Consolidated, Morris Heights, N. J.:

Auxiliary wood schooner yacht Haida for Max Fleischman; length overall, 105 ft.; estimated gross tonnage, 130; one six-cylinder explosive engine of 200 H. P.

Steel yacht Jemima III for Charles H. Fletcher; estimated gross tonnage, 120; two explosive engines.

One wood cabin launch for L. J. Bell; length over all, 40 ft.; estimated gross tonnage, 12; one four-cylinder explosive engine of 32 H. P.

One wood cabin launch for J. H. Johnson; length over all, 60 ft.; estimated gross tonnage, 15; one six-cylinder explosive engine of 100 H. P.

One open wood launch for Edw. Kemp; length over all, 45 ft.; estimated gross tonnage, 7; one six-cylinder explosive engine of 50 H. P.

Two wood cabin launches for New York police department; length over all, 45 ft.; estimated gross tonnage, 10; one four-cylinder explosive engine of 65 H. P. for each.

One open wood launch for W. B. Thomas; length over all, 22 ft.; estimated gross tonnage, 2.5; 4-H. P. naphtha engine.

One open wood launch for U. S. navy pay office; length over all, 30 ft.; estimated gross tonnage, 6; one four-cylinder explosive engine of 16 H. P.

One wood cabin launch for T. M. Wilson; length over all, 60 ft.; estimated gross tonnage, 39; one six-cylinder explosive engine of 50 H. P.

One wood cabin launch for A. V. Wyckoff; length over all, 46 ft.; estimated gross tonnage, 25; one explosive engine of 25 H. P.

One cabin launch for Willliam V. Cheesebrough; length over all, 68 ft.; estimated gross tonnage, 45; two 25-H. P. explosive engines.

One six-cylinder, 100 H. P. explosive engine for W. J. Kingsland, Manila, P. I.; one Seabury water tube boiler for steam yacht Niagara IV, owned by Howard Gould, 1,671 sq. ft. heating surface; one Seabury water tube boiler for steam yacht Little Sovereign, owned by M. C. D. Borden, 1,424 sq. ft. heating surface; one Seabury water tube boiler for Cuban interests; 207 sq. ft. heating surface; one Seabury water tube boiler for F. Gomez, 333 sq. ft. heating surface; one Seabury water tube boiler for Maldarado & Co., 118 sq. ft. heating surface.

Maryland Steel Co., Sparrow's Point, Md.:

Sea-going steel suction dredges Raritan and Navesink for the U. S. Engineer corps, Major J. C. Sanford, Philadelphia, Pa.; length over all, 290 ft.; approximate value, $400,000 each; estimated gross tonnage, 3,200; compound, twin screw engines of 2,000 H. P.; four Scotch boilers.

Three dump barges for the Isthmian canal commission; length over all, 123 ft.; approximate value, $25,000 each; estimated gross tonnage, 150.

Pipe line dredge for the U. S. Engineers' department, Major J. C. Sanford, Philadelphia, Pa.; length over all, 134 ft.; approximate value, $50,000; estimated gross tonnage, 200.

Triple, single-screw engine of 900 H. P. and one Scotch boiler, for the P. Dougherty Co., Baltimore, Md.

Charles H. Curtis & Co., Ellsworth, Me.:

Wooden schooner for stock; length over all, 73 ft.; approximate value, $5,500; estimated gross tonnage, 60.

Evan Owen, Weems, Va..

Wooden oyster and crab dredger, Albatross, for stock; length over all, 50 ft.; approximate value, $3,300; estimated gross tonnage, 20; 30 H. P. gasoline engine.

Stearns & McKay, Marblehead, Mass.:

Gasoline cruiser for F. J. Cockburn, Quebec, Can.; length over all, 38 ft.; approximate value, $3,500; two-cylinder, four-cycle explosive gasoline motor of 15 H. P.

Electric Launch Co., Bayonne, N. J.:

Launch for the U. S. Revenue Cutter Service; length over all, 70 ft.; approximate value, $20,000; displacement, 31½ tons; twin-screw, 60 H. P. Standard gasoline engine; hull of wood with three steel bulkheads.

W. Irving Adams & Son, East Boothbay, Me.:

Wooden passenger steamer for the Augusta, Gardiner & Boothbay Steamboat Co.; length over all, 88 ft. 6 in., engines of 250 H. P. being built by the Bath Iron Works, Bath, Me.

Mozena Bros., Clarington, O.;

One wharf boat for the city of Portsmouth, O.; length over all, 150 ft.

J. T. Sharpley, Franklin City, Va.:

One wooden barge for stock; length over all, 50 ft.; approximate value, $300; estimated gross tonnage, 20.

I. Matheson & Co., New Glasgow, N. S.:

Three-masted steel schooner for J. W. Carmichael & Co., New Glasgow, N. S.; length over all, 150 ft.; approximate value, $30,000; estimated gross tonnage, 475.

Brown Transportation Line, M. P. Brown, Mgr., Syracuse, N. Y.:

One wooden flush deck steam propeller for themselves; length over all, 125 ft.; approximate value, $30,000; to have compound engines of 250 H. P., 10, 20, by 14 stroke and one boiler.

Neafie & Levy Ship & Engine Building Co., Philadelphia, Pa.:

Steel tug boat Adriatic for Capt. Martin, Philadelphia; length over all, 85 ft.; approximate value, $29,900; estimated gross tonnage, 120; single engine of 300 H. P.; one flue and return tube boiler.

Diamond Joe Line, Dubuque, Ia.:

Stern wheel wooden steamer Dubuque for the Diamond Joe Line steamers, St. Louis, Mo., to receive new hull; length over all, 257.2 ft.; approximate value of repairs, $20,000; condensing engines of 858 H. P.; three cylindrical flued boilers.

Bertelsen & Petersen Engineering Co., 140 Border street, East Boston, Mass.:

One vertical inverted single cylinder engine, 16 in. diameter by 20 in. stroke; surface condenser, 550 sq. ft.; firebox, flue and return tubular boiler; to be put in a tug for the Merrimac River Towing Co., Newburyport, Mass.

McIntyre & Henderson, foot of Montgomery street, Baltimore, Md.:

One steel tug boat for stock; length over all, 105 ft.; estiimated gross tonnage, 240; one Scotch boiler, 10½ ft. by 11 ft.

A marine leg boiler for the tug Claribel of West Point.

A marine leg boiler for the tug Cecil of Chesapeake City.

West Oakland Ship Yards of Southern Pacific Co., West Oakland, Cal.:

Side wheel ferry steamer, Melrose, for the Southern Pacific Co., San Francisco, Cal.; length over all, 268 ft.; approximate value, $152,000; estimated gross tonnage, 2,197; tandem horizontal engines of 1,500 H. P.; four Scotch Dryback boilers.

Nilson Yacht Building Co., Baltimore, Md.:

Gasoline yacht Crusoe for George Innes of New York; length over all, 68 ft.; approximate value, $15,000; estimated gross tonnage, 32.

Gasoline power tender for the Adams, Cottman Co., Baltimore, Md.; length over all, 40 ft.; approximate value, $4,000; estimated gross tonnage, 10.

American Car & Foundry Co., Wilmington, Del.:

Six car floats for the Pennsylvania R. R. Co.; length over all, 250 ft. each; estimated gross tonnage, 1,200.

One dredge scow for the Coastwise Dredging Co.; length over all, 138 ft.; estimated gross tonnage, 900.

One sectional barge for the Delaware River Lighterage Co.; length over all, 130 ft.; estimated gross tonnage, 550.

James Rees & Sons Co., Pittsburg, Pa.:

Steel steamer B. F. Jones for the Vesta Coal Co.; length over all, 155 ft.; approximate value, $70,000; estimated gross tonnage, 150; tandem compound engines, 450 H. P.; three horizontal two flue marine boilers.

Steel dredge and snag boat for the republic of Columbia, South America; length over all, 125 ft.; approximate value, $40,000; estimated gross tonnage, 100; high pressure engine of 125 H. P., two horizontal tubular boilers.

E. H. Brown, Taunton, Mass.:

Wooden launch for G. L. Blake, Lonsdale, R. I.; length over all, 33 ft.; approximate value, $1,800; gasoline motor of 12 H. P.

Wooden launch for S. G. Wilkes, Taunton, Mass.; length over all, 33 ft.; approximate value, $1,800; gasoline motor of 12 H. P.

Fore River Ship Building Co., Quincy, Mass.:

No merchant work is in progress at this yard. Four light vessels for the United States government lighthouse board are being built.

Mczena Bros., Clarington, O.:

One wharf boat for Portsmouth, O.; 150 ft. long, 30 ft. wide and 5 ft. deep.

Dubuque Boat & Boiler Works, Dubuque, Ia.:

Two stern wheel hydraulic dredges for the United States engineering corps; length over all, 222 ft.; approximate value $90,000 each; estimated gross tonnage, 600 each; Mississippi type of high presssure engines, 24 in. by 8 ft.; six Mississippi type boilers, 44 in. by 30 ft., 170 lbs. pressure.

Eighteen pontoons for the United States engineeering corps; length over all, 47 ft. 6 in.; approximate value, $2,000.

H. D. Bendixsen Ship Building Co., Eureka, Cal..

Wooden steam schooner Shoshone for Charles R. McCormick & Co., 25 California street, San Francisco, Cal.; length over all, 195 ft.; approximate value, $85,000; estimated gross tonnage, 600.

Wooden steam schooner Katherine for Holmes Eureka Lumber Co., 945 Monadnock building, San Francisco, Cal.; length over all, 180 ft.; approximate value, $75,000; estimated gross tonnage, 475.

Oliver Gildersleeve & Sons, Gildersleeve, Conn.:

Two wooden deck lighters for stock; length over all, 110 ft.; approximate value, $9,000 each; estimated gross tonnage, 300 each.

One wooden coal barge for James McWilliams of New York; length over all, 130 ft.; approximate value, $12,000; estimated gross tonnage, 500.

One wooden coal barge for stock; length over all, 105 ft.; approximate value, $6,000; estimated gross tonnage, 200.

Southern Ship Building Co., Tottenville, S. I., N. Y.:

One coal lighter for the Havana Coal Co., Philadelphia, Pa.; length over all, 100 ft.; approximate value, $7,000.

Two coal lighters for the Havana Coal Co., Philadelphia, Pa.; length over all, 100 ft.; approximate value, $7,000 each.

One deck lighter for George Painter, Chicago, Ill.; length over all, 86 ft.; approximate value, $3,000.

One coal lighter for the Fore River Ship Building Co., Quincy, Mass.; length over all, 110 ft.; approximate value, $18,000.

Oliver Reeder & Son, Baltimore, Md.:

One open wooden harbor lighter; length over all, 92 ft.; approximate value, $3,600; estimated gross tonnage, 165.

One open wooden harbor lighter; length over all, 92 ft.; approximate value, $3,500; estimated gross tonnage, 160.

One wooden covered harbor lighter; length over all, 46 ft.; approximate value, $1,200; estimated gross tonnage, 55.

Hull of wooden tug boat; length over all, 76 ft.; approximate value, $15,000; estimated gross tonnage, 40.

United Engineering Works, San Francisco, Cal.:

Triple expansion, single screw engine of 600 H. P. and one water tube boiler, for steamer F. S. Loop, building for the Loop Lumber Co.

One compound, single screw engine of 425 H. P. and one Scotch marine boiler, for the steamer Bowdoin, building for W. G. Tibbetts.

One compound, single screw engine of 425 H. P. and one Scotch marine boiler, for the steamer Tahoe.

One compound, single screw engine of 400 H. P. and one Scotch marine boiler, for the steamer Loggie, building for the McKay Lumber Co.

Eurlee Dry Dock Co., Pt. Richmond, S. I., N. Y.:

Steel ferry boat Jamestown for the Erie R. R. Co., New York; length overall, 224 ft.; estimated net tonnage, 983; two compound engines, 18 by 38 by 28, 1,200 H. P.; two Scotch boilers.

Steel steam lighter for the Delaware, Lackawanna & Western R. R. Co., New York.; length over all, 110 ft. 6 in.; estimated gross tonnage, 292; single engine, 22 by 26; H. P., 400; one Scotch boiler.

Steel tug for stock; length over all, 120 ft.; estimated gross tonnage, 150; one compound engine, 18 by 38 by 26, H. P., 550; one Scotch boiler.

George H. Miller & Co., Patchogue, L. I., N. Y.:

Gasoline oyster boat Vigilant for R. Southard; length over all, 32 ft.; approximate value, $1,000; estimated gross tonnage, 5; gasoline engine of 12 H. P.

Auxiliary yawl for I. M. Miller; length over all, 35 ft.; approximate value, $2,000; estimated gross tonnage, 6; 6-H. P. Baldwin engine.

Auxiliary yawl for George Henry;

length over all, 38 ft.; approximate value, $2,300; estimated gross tonnage, 8; 7-H. P. Palmer engine.

Launch for G. Martin; length over all, 28 ft.; approximate value $800; 8-H. P. Mianus gasoline motor.

Joseph Supple, Fort Belmont street, Portland, Ore.:

Hull for stern-wheel river steamer Mascot of Portland, for the Lewis River Transportation Co., Portland, Ore.; length over all, 136 ft.; approximate value (hull only), $8,000; estimated gross tonnage, 350.

Hull for dredge for Brown Diking Co., Portland, Ore.; length over all, 80 ft.; approximate value, $3,750.

One gasoline launch for the Sluvia del Oro Mining Co., Mexico.; length over all, 50 ft.; approximate value, without machinery, $1,500.

J. H. Paine & Son, Inc., Noank, Conn.:

Two compound engines for the Gilbert Transportation Co., Mystic, Conn.; 12 and 25 ft. by 16 ft.

Matthews Ship Building Co., Hoquiam, Wash.:

Steam schooner Saginaw for the Hart-Wood Lumber Co., San Francisco, Cal.; length over all, 205 ft.; approximate value, $12,500; triple expansion engine of 750 H. P.; two Scotch marine boilers.

Steam schooner San Jacinto for the E. K. Wood Lumber Co., San Francisco, Cal.; length over all, 176 ft.; approximate value, $80,000; compound engine of 450 H. P.; one Scotch marine boiler.

Steam schooner Shasta for the E. K. Wood Lumber Co., San Francisco, Cal.; length over all, 205 ft.; approximate value, $140,000; triple expansion engine of 600 H. P.; one Scotch marine boiler.

Pusey & Jones Co., Wilmington, Del.:

Single screw, wooden steamer Androscoggin for the U. S. Revenue Cutter Service; length over all, 210 ft.; estimated gross tonnage, 1,006; triple expansion engine, 1,800 H. P.; two Scotch boilers.

Single screw, steel hull, revenue cutter No. 16, for the U. S. Revenue Cutter Service; length over all, 152 ft.; triple expansion engine, 1,500 H. P.; one water tube boiler and one Scotch boiler.

Single screw, steel hull, Revenue Cutter No. 19; length over all, 92 ft. 6 in.; one compound surface condensing engine of 275 H. P.; one Scotch boiler.

Thomas McCosker & Co., Baltimore, Md.:

One wooden tug for P. Dougherty & Co., Baltimore, Md.; length over all, 136 ft.; approximate value, $60,000.

Quintard Iron Works Co., New York:

Machinery for one passenger steamer for the New England Steamship Co., New Haven, Conn.; double compound inclined engines and feathering wheels with 10 Scotch boilers; estimated H. P., about 10,000.

One 38 in. by 8 ft. beam engine for the Atlantic Works, East Boston, Mass., for a ferry boat.

Four Scotch boilers for the steamer New Hampshire, owned by the New England Steamship Co.

One return tubular boiler for Transfer No. 8, New York, New Haven & Hartford R. R. Co.

One return tubular boiler for Transfer No. 9, New York, New Haven & Hartford R. R. Co.

United Engineering Works, Alameda, Cal..

Single screw, triple expansion water tube boiler for wooden steam schooner S. F. Loop, owned by the Loop Lumber Co., San Francisco, Cal.; estimated H. P., 600.

Two single screw compound Scotch boilers for the steam schooners Bowdoin and Tahoe, owned by W. Tibbitts, San Francisco, Cal.; estimated H. P., 400 each.

One single screw compound water tube boiler for the steam schooner Daisy, owned by the Freeman Steamship Co., San Francisco, Cal.; estimated H. P., 400.

One single screw compound Scotch marine boiler for the steam schooner J. J. Loggie, owned by the McKay Steamship Co., San Francisco, Cal.; estimated H. P., 300.

Phoenix Foundry & Locomotive Works, St. John, N. B.:

Several steel barges of 200 cubic yards capacity for the Dominion government.

Boilers for river steamers and machinery for a tug boat.

Frederick S. Nock, East Greenwich, Rhode Island:

Gasoline launch for H. S. Bullock, New York; length over all, 34 ft.; approximate value, $2,200; single screw gasoline engine of 15 H. P.

Gasoline launch for W. H. Peck, New York; length over all, 40 ft.; approximate value, $4,000; two gasoline engines, four-cylinder, four stroke, total of 30 H. P.

Gasoline launch Katherine for W. C. Gardiner, Providence, R. I.; length over all, 40 ft.; approximate value, $3,500; two gasoline engines, two-cylinder, two stroke, total of 28 H. P.

William McKie, 100 Border Street, East Boston, Mass.:

Ferryboat for the Boston, Revere Beach & Lynn R. R. Co.; length over all, 150 ft.; approximate value, $90,000; estimated gross tonnage, 350.

Tarr & James, Essex, Mass.:

Auxiliary schooner for the Gorton-Pew Fisheries Co., Gloucester, Mass.; length over all, 131 ft.; approximate value, $24,000; estimated gross tonnage, 157.

Schooner for Capt. J. O. Brigham; length over all, 120 ft.; approximate value, $16,000; estimated gross tonnage, 107.

Kelley-Spear Co., Bath, Me.:

One coal barge; length over all, 200 ft.; approximate value, $35,000; estimated gross tonnage, 700.

W. D. Crammond, Hawesville, Ky.:

Two wooden barges for himself; length over all, 100 ft.; approximate value, $1,800; estimated gross tonnage, 800.

W. & A. Fletcher Co., Hoboken, N. J.:

Steamer Mohican for the Lake George Steamboat Co.; length over all, 116 ft.; approximate value, $80,000; compound twin screw, cylinders, 10 x 21½ by 16, 600 H. P.; two water tube boilers.

Ferry boat, Perth Amboy, for the Staten Island Railway Co.; length over all, 151 ft.; approximate value, $130,000; single beam engine, cylinder, 42 in., stroke 108 in., 600 H. P., one return tubular leg boiler.

Paddle steamer Princeton for the Hudson Navigation Co.; length over all, 440 ft.; approximate value, $1,000,000; single beam engine, cylinder 84 in., stroke 144 in., 4,500 H. P.; four return flue leg boilers.

Paddle steamer Knickerbocker for the Hudson Navigation Co.; length over all, 336 ft.; approximate value, $550,000; single beam engine, cylinder 70 in., stroke 144 in., 3,000 H. P., four return tubular leg boilers.

Kruse & Banks, Marshfield, Ore.:

Wooden tug E. P. Ripley for Atchison, Topeka & Santa Fe R. R. Co.; length over all, 120 ft.; estimated gross tonnage, 170.

Wooden steamer Fairhaven for J. E. Davenport, San Francisco, Cal.; length over all, 188 ft.; estimated gross tonnage, 490.

Main Street Iron Works, 163-173 Main Street, San Francisco, Cal.

Engine and boiler for tug E. G. Ripley, building by Kruse & Banks,

Marshfield, Ore., for Atchison, Topeka & Santa Fe R. R. Co.; engine is compound, single-screw, of 800 H. P. One Babcock & Wilcox water tube boiler.

Engine and boiler for steamer Fairhaven, building by Kruse & Banks, Marshfield, Ore., for J. E. Davenport, San Francisco, Cal.; compound engine of 400 H. P.; one Scotch boiler.

Engine and boiler for steamer building by John W. Dickie & Son, Raymond, Wash., for Ira J. Harmon, San Francisco, Cal.; triple-expansion, single-screw, 600 H. P.; two Babcock & Wilcox water tube boilers.

Atlantic Works, Boston, Mass.:

Side wheel passenger steamer Betty Alden for the Nantasket Beach Steamboat Co., Boston, Mass.; length over all, 185 ft.; capacity for 2,000 passengers; diagonal triple expansion engines, 1,100 H. P.; two Scotch boilers.

One fire box flue and return tubular boiler for side wheel ferry boat for the Revere Beach & Lynn Co., Boston, Mass.

One Scotch boiler for tug boat building by the Fore River Ship Building Co., Quincy, Mass., for the New England Navigation Co.

One fire box, flue and return tubular boiler for the tug Cora L. Staples for the Staples Coal Co.

One Scotch boiler for the freight and passenger steamer City of Gloucester for Gloucester Steamship Co., Boston.

One 16-yard bucket for the dredger Eugene for the Breyman Bros., Boston, Mass. The largest bucket of this type ever made.

Johnson Iron Works, Ltd., New Orleans, La.:

One steel tug boat; length over all, 75 ft.; approximate value, $6,000; hull and house only.

One steam launch; length over all, 39 ft.; approximate value, $3,000; compound engine; one boiler.

One steel stern wheel boat; length over all, 69 ft.; approximate value, $8,000; high pressure engines and water tube boiler.

Eight steel barges; length over all, 60 ft.; approximate value, $12,000.

Arthur D. Story, Essex, Mass.:

One wooden schooner for Watson Bros., Boston, Mass.; length over all, 117 ft.; approximate value, $14,000; estimated gross tonnage, 140.

One wooden schooner for builder; length over all, 117 ft.; approximate value, $14,000; estimated gross tonnage, 140.

One wooden schooner for Capt. Wesley Robinson, Brooklyn, N. Y.; length over all, 65 ft.; approximate value, $7,000; estimated gross tonnage, 35; gasoline auxiliary engine of 25 H. P.

Kingsford Foundry & Machine Works, Oswego, N. Y.:

One single leg marine boiler, 10 ft. by 15 ft. 6 in.

One Scotch marine boiler, 8 by 10 ft.

One single leg marine boiler, 7 by 12 ft.

One single leg marine boiler, 7 ft. by 10 ft. 6 in.

Two Scotch marine boilers, 7 ft. 6 in. by 10 ft.

One single leg marine boiler, 6 by 11 ft.

One Scotch marine boiler, 10 ft. 6 in. by 12 ft.

One Scotch marine boiler, 9 ft. 6 in. by 11 ft.

One Scotch marine boiler, 9 ft. 6 in. by 10 ft.

One single leg marine boiler, 7 by 9 ft.

Two Scotch marine boilers, 10 ft. 6 in. by 12 ft. 6 in.

One single leg marine boiler, 6 by 15 ft.

Four Scotch marine boilers, 8 ft. by 12 ft.

Two Scotch marine boilers, 10 ft. by 12 ft.

C. Hiltebrant, Rondout, N. Y.:

Wooden ice barge, Mrs. C. Mulford, for Charles Mulford, Glasco, N. Y.; length over all, 98 ft.

Wooden ice barge, New York, for Robert A. Scott, New York; length over all, 98 ft.

Wooden coal barge, Blue Band, for McWilliams Blue Line, New York; length over all, 115 ft.

Wooden coal barge, Blue Jay, for McWilliams Blue Line, New York; length over all, 115 ft.

Wooden coal barge, Blue Beard, for McWilliams Blue Line, New York; length over all, 110 ft.

Wooden coal barge, Baby Blue, for McWilliams Blue Line, New York; length over all, 115 ft.

Wooden coal barge, Hazel Mitchell, for Mesick & Mesick, New York; length over all, 110 ft.

Wooden coal barge for McCaffey's Sons, New York; length over all, 110 ft.

Wooden coal barge, Ellen Olney, for Edward Olney, New York; length over all, 110 ft.

Wooden coal barge for James Fields, New York; length over all, 100 ft.

Wooden ice barge, Kingston, for Robert A. Scott, New York; length over all, 98 ft.

Floating dry dock for own use; length over all, 180 ft.; lifting capacity, 1,200 tons.

Skinner Ship Building & Dry Dock Co., Baltimore, Md..

Steel tug S. O. Co., No. 18, for the Standard Oil Co., 26 Broadway, New York; length over all, 101 ft.; estimated gross tonnage, 179; single screw compound engine of 650 H. P.; one Scotch boiler.

Steel tug S. O. Co., No. 19, for the Standard Oil Co., 26 Broadway, New York; length over all, 101 ft.; estimated gross tonnage, 179; single screw compound engine of 650 H. P.; one Scotch boiler.

Wooden car float for stock; length over all, 222 ft.; estimated gross tonnage, 642.

Wooden coal barge for the Standard Dredging Co., Wilmington, Del.; length over all, 100 ft.; estimated gross tonnage, 240.

One compound engine of 800 H. P.; one Scotch boiler, for stock.

Burrell-Johnson Co., Yarmouth, N. S.:

Wooden tug for T. F. Smith & Co., Halifax, N. S.; length over all, 55 ft.; approximate value, $2,500; estimated gross tonnage, 35; compound single screw engines of 40 H. P.; one vertical boiler.

Wooden steamer Kathleen for M. Neville, Halifax, N. S.; length over all, 75 ft.; approximate value, $10,000; estimated gross tonnage, 50; compound single screw engine of 100 H. P.; one vertical boiler.

Wooden passenger steamer for Island Tug Co., Charlottetown, P. E. I.; length over all, 120 ft.; approximate value, $30,000; estimated gross tonnage, 250; compound twin screw engine of 225 H. P.; one horizontal boiler.

MOSHER WATER TUBE BOILERS.

The Mosher Water Tube Boiler Co., 1 Broadway, New York, recently received orders to equip the United States gunboat Nashville with six of its boilers, the United States coal barges now building at the Brooklyn navy yard with four boilers, the United States steamer Norfolk with two boilers, and a torpedo boat with eight boilers.

The new steamer S. G. Simpson, built by Crawford & Reid, Tacoma, Wash., was given a successful builder's trial recently and developed a speed of 15¼ miles, whereas her contract called for only 14 miles.

LAKE LAUNCHINGS DURING 1907

During 1907 the lake shipyards, exclusive of the Canadian yards, launched 56 vessels of which 40 were bulk freighters, three package freighters, one passenger steamer, one wrecker, one lighter, one mailboat, five tugs and four scows. Of these the American Ship Building Co. launched 34 vessels, 29 of them being bulk freighters, one passenger steamer, one package freighter, a wrecker, a lighter and a tug. The Great Lakes Engineering Works launched nine vessels, eight being bulk freighters and one a package freighter. The Toledo Ship Building Co. launched three bulk freighters. These 40 bulk freighters have a carrying capacity of 368,000 gross tons on a single trip. However, one of the new steamers, the Cypress, sank on her second trip, so that the net addition to the available carrying capacity of the lake fleet is 361,000 or 7,220,000 tons in an average season of 20 trips. The new passenger steamer City of Cleveland, building at the Wyandotte yard of the American Ship Building Co., was burned when nearing completion so that her entire superstructure was destroyed.

The Canadian yards during the year launched two bulk freighters and two car ferries.

During 1906 the ship builders of the great lakes, exclusive of the Canadian yards, launched 47 vessels, of which 40 were bulk freighters, two passenger steamers, two package freighters, two car ferries and one sand dredge. The 40 bulk freighters have a carrying capacity of 381,000 tons on a single trip or 7,620,000 gross tons in an average season of 20 trips.

During 1905 the ship builders of the great lakes launched 32 steamers, of which 29 were bulk freighters, two package freighters and one car ferry. These 29 bulk freighters have 260,200 gross tons carrying capacity on a single trip or 5,204,000 gross tons in an average season of 20 trips.

During 1904 lake ship yards launched 13 vessels of which seven were bulk freighters, two package freighters, one car ferry and three passenger steamers. The seven bulk freighters have a carrying capacity of 51,300 tons on a single trip or 1,026,000 in an average season of 20 trips.

During 1903 lake ship yards launched 50 vessels of which 42 were bulk freighters, five car ferries and three passenger steamers. These 42 bulk freighters have a carrying capacity of 213,250 tons on a single trip or 4,265,000 tons in an average season of 20 trips. It should be stated, however, that ten of these freighters were built by Mr. Wolvin for St. Lawrence river trade and are actively engaged in that service, but as they are available for the ore trade, they have been classed as bulk freighters with an average capacity of 3,000 tons each on 18-ft. draught.

During 1902 the lake ship yards launched 42 vessels, of which 32 were bulk freighters (two f them barges), two passenger steamers, three package freighters, two car ferries and two vessels for salt water service. These thirty-two bulk freighters have a carrying capacity of 171,910 tons on a single trip or 3,438,200 tons in an average season of 20 trips.

During the past six yers, therefore, ships having a carrying capacity of 29,773,200 gross tons in a full season have been added to the lake fleet. Moreover there are now on the stocks for 1908 delivery, exclusive of Canadian yards, 24 bulk freighters with a carrying capacity on a single trip of 204,700 tons or 4,094,000 tons in a full season.

The particulars of vessels launched will be found in the accompanying tables.

American Ship Building Co., Cleveland, O.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Wyandotte	Passenger steamer	City of Cleveland	404	.....	Detroit & Cleveland Navigation Co., Detroit.
Cleveland	Freighter	Mathew Andrews	552	10,000	Henry Steinbrenner, Cleveland.
Lorain	Freighter	Hugh Kennedy	552	10,000	Capt. John Mitchell, Cleveland.
Buffalo	Wrecking steamer	Favorite	195	.....	Great Lakes Towing Co., Cleveland.
Wyandotte	Freighter	J. H. Bartow	524	9,000	E. D. Carter, Erie, Pa.
Chicago	Freighter	Thos. Lynch	600	12,000	Pittsburg Steamship Co., Cleveland.
W. Bay City	Freighter	H. P. McIntosh	540	10,000	Gilchrist Transportation Co., Cleveland.
Bay City	Freighter	Henry Phipps	600	12,000	Pittsburg Steamship Co., Cleveland.
Lorain	Freighter	Leland S. DeGraef	605	12,000	Weston Transit Co., N. Tonawanda, N. Y.
W. Superior	Freighter	George F. Baker	600	12,000	Pittsburg Steamship Co., Cleveland.
Wyandotte	Freighter	Chas. O. Jenkins	524	9,000	Jenkins Steamship Co., Cleveland.
Buffalo	Package freighter	Wissahickon	372	5,000	Erie & Western Transportation Co., Buffalo.
Bay City	Freighter	Hemlock	440	7,000	Lackawanna Steamship Co., Buffalo.
Lorain	Freighter	Wm. M. Mills	605	12,000	Weston Transit Co., N. Tonawanda, N. Y.
Cleveland	Freighter	Jay C. Morse	552	10,000	Pickands, Mather & Co., Cleveland.
Lorain	Freighter	Odonah	440	7,000	Lackawanna Steamship Co., Buffalo.
Wyandotte	Freighter	Calumet	440	7,000	Lackawanna Steamship Co., Buffalo.
Lorain	Freighter	Cyprus	440	7,000	Lackawanna Steamship Co., Buffalo.
So. Chicago	Freighter	Salt Lake City	552	10,000	W. A. & A. H. Hawgood, Cleveland.
Lorain	Freighter	Crete	440	7,000	Lackawanna Steamship Co., Buffalo.
Superior	Freighter	Ward Ames	552	10,000	Acme Steamship Co., Duluth, Minn.
Cleveland	Freighter	J. J. Sullivan	552	10,000	Superior Steamship Co., Cleveland.
Wyandotte	Freighter	Edwin N. Ohl	440	7,000	Vesta Transit Co., Cleveland, W. H. Becker, Mngr.
Bay City	Freighter	Arthur H. Hawgood	569	10,000	Neptune Steamship Co., Cleveland.
Lorain	Freighter	Verona	440	7,000	Lackawanna Steamship Co., Buffalo.
Buffalo	Steel tug	Harvard	78	.....	Great Lakes Towing Co., Cleveland.
Buffalo	Lighter	Reliance	250	3,000	Great Lakes Towing Co., Cleveland.
So. Chicago	Freighter	Wm. A. Hawgood	552	10,000	Atlas Steamship Co., Cleveland.
Lorain	Freighter	Adriatic	440	7,000	Lackawanna Steamship Co., Buffalo.
Superior	Freighter	H. P. Bope	552	10,000	Standard Steamship Co., Duluth, Minn.
Cleveland	Freighter	Elba	440	7,000	Lackawanna Steamship Co., Buffalo.
Lorain	Freighter	Chas. W. Kotcher	440	7,000	Detroit Steamship Co., Detroit, Mich.
Wyandotte	Freighter	Thomas Barlum	500	8,000	Postal Steamship Co., Detroit, Mich.
Bay City	Freighter	Caldera	524	9,000	S. B. Cranage, Bay City.

Great Lakes Engineering Works, Detroit, Mich.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Ecorse	Freighter	Thomas F. Cole	605	12,000	Pittsburg Steamship Co., Cleveland.
Ecorse	Freighter	D. O. Mills	552	10,000	Pickands, Mather & Co., Cleveland.
St. Clair	Freighter	Wm. B. Davock	440	7,000	Vulcan Steamship Co., Cleveland.
Ecorse	Freighter	Wilbeu	574	11,000	Wm. P. Snyder, Pittsburg, Pa.
Ecorse	Freighter	Milinokett	524	9,000	Howard L. Shaw & James Davidson, Bay City, Mich.
Ecorse	Freighter	John J. Boland	500	8,000	York Steamship Co., York, Pa.
Ecorse	Package freighter	Rochester	400	6,500	Western Transit Co., Buffalo, N. Y.
Ecorse	Freighter	Josiah G. Munro	552	10,000	Frontier Steamship Co., N. Tonawanda, N. Y.
Ecorse	Freighter	Jacob T. Kopp	500	8,000	Pennsylvania Steamship Co., York, Pa.
Ecorse	Package freighter	Bennington	256	3,000	Rutland Transit Co., Ogdensburg, N. Y.

Toledo Ship Building Co., Toledo, O.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Toledo	Freighter	Charles Hubbard	460	7,500	L. C. Smith Transportation Co., Cleveland.
Toledo	Freighter	Smith Thompson	458	7,500	L. C. Smith Transportation Co., Cleveland.
Toledo	Freighter	John Dunn Jr.	524	9,000	American Transit Co.

Canadian Ship Building Co., Toronto, Ont.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Toronto	Car ferry	Ontario No. 1	325	26 cars 1,000 passengers	Ontario Car Ferry Co., Montreal, Can.
Bridgeburg	Freighter	E. B. Osler	510	9,000	St. Lawrence & Chicago Steam Nav. Co., Toronto, Can

Collingwood Ship Building Co., Collingwood, Ont.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Collingwood	Freighter	Collingwood	406	5,500	Farrar Transportation Co., Collingwood, Ont.

Polson Iron Works, Toronto, Ont.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Toronto	Car ferry	Charles Lyon	280	.....	Canadian Pacific Railway Co.

Johnston Bros., Ferrysburg, Mich.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Ferrysburg	Tug	Charles E. Williams	87	.....	Buffalo Dredging Co., Buffalo.
Ferrysburg	Tug	W. S. Taylor	...	.....	Nau Tug Line, Green Bay, Wis.
Ferrysburg	Mail boat	C. F. Bielman Jr.	75	.....	C. F. Bielman, Detroit, Mich.

Laird & Sons, Ashtabula, O.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Ashtabula	Fueling scow		...	.....	Ironville Coal & Dock Co., Toledo, O.

Empire Ship Building Co., Buffalo, N. Y.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Buffalo	Steel scow		...	.....	Empire Engineering Corporation, Buffalo.

Great Lakes Towing Co., Chicago, Ill.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Chicago	Tug	Abner C. Harding	95	.....	Great Lakes Towing Co., Cleveland.

Benjamin L. Coles, Buffalo, N. Y.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.	NAME AND ADDRESS OF OWNER.
Buffalo	Tug	John Kelderhouse	31	.....	Benjamin L. Coles, Buffalo, N. Y.

James Davidson, West Bay City, Mich.

WHERE BUILT.	TYPE.	NAME OF VESSEL.	LENGTH OVERALL.	CARRYING CAPACITY.
W. Bay City	Dump scow		150	500 yds.
W. Bay City	Dump scow		...	.....

SHIP YARD WORK IN BALTIMORE.

Baltimore, Dec. 28.—Work is rapidly progressing on the two self-propelling suction dredges for the engineer's department, being built by the Maryland Steel Co. The material is all in the yard and they are all in frame and will soon have their outside plating on. Their names will be the Navesink and Raritan. Besides these dredges the Maryland Steel Co. has on its docks three dump scows for use on the Panama canal which will be knocked down and rebuilt at the canal.

The Ellicott Machine Co. has contracted for a suction dredge for improving Savannah harbor. The hull, which has been sub-let to the Maryland Steel Co., is 134 ft. long, 38 ft. beam and 8 ft. deep.

The Thomas McCosker Co. are building the hull for a wooden tug for the P. Dougherty & Co., which is 126 ft. long, 25 ft. 6 in. beam and 14 ft. deep. The boilers, engines, joinery and outfit will be furnished and installed by the Maryland Steel Co.

Spedden & Co. have building for stock, a lighter 91 ft. long, 28 ft. beam and 7½ ft. deep, with a carrying capacity of 350 tons. The coast survey steamer Bache, lighthouse ship Holly and the fruiter Barnstable are at their wharf for repairs, and a general overhauling to machinery.

The Skinner Ship Building & Dry Dock Co. have just launched the last of the four tugs they are building for the Standard Oil Co. These tugs, which are all the same, are 100 ft. long over all, 90 ft. between perpendiculars, 23 ft. beam and 12 ft. deep, and are propelled by a fore and aft compound engine 17 in. and 34 in. by 26-in. stroke. Steam is furnished by one Scotch boiler 13 ft. 6 in. mean diameter by 11 ft. long with a working pressure of 150 lbs. They are for use in New York harbor, and are built especially strong—the frames, which are 6 in. angles, are spaced 15 in. apart and the plating along the water line is 25 lbs.

The Skinner Co. has on stock two lighters for the Chesapeake Steamship Co. and one for the Atlantic Transport Co. Repairs have just been completed on a scow for the B. & O. R. R., the Apache, for the revenue service, and the tug Chief, and a dredge for the Standard Dredging Co.

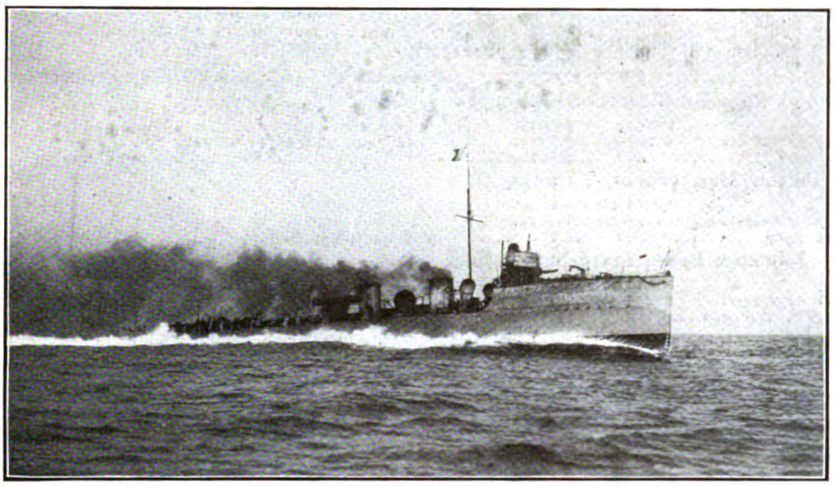
The Heffernan Dry Dock Co., Quartermaster Harbor, Wash., was the successful bidder for effecting the repairs to the Pacific Coast Steamship Co.'s steamer Al-Ki, which was damaged in Alaskan waters. The bids were as follows: Hall Bros., Port Blakely, Wash., $3,251; Heffernan Dry Dock Co., $2,920; Moran Co., Seattle, Wash., $4,150.

The steel steam schooner which the Moran Co., Seattle, Wash., has under construction for the Alaska-Pacific Steamship Co., will be named Falcon. She is of 2,500 tons and will be ready for launching in April. There are also two other hulls of the same design and dimensions, i. e., 250 ft. long, 41 ft. beam and 19 ft. depth of hold, which are under construction at this yard and which will be completed at about the same time. One of these is for the Robert Dollar Co. and the other for Charles Nelson.

The William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa., is installing new boilers in the Morgan line steamship Excelsior, owned by the Southern Pacific Railway Co.

FASTER THAN MOST RAILWAY TRAINS.

In view of the great interest taken in naval questions at the present day, the new type of British ocean-going



TORPEDO BOAT DESTROYER GHURKA SPEEDING AT 34½ KNOTS.

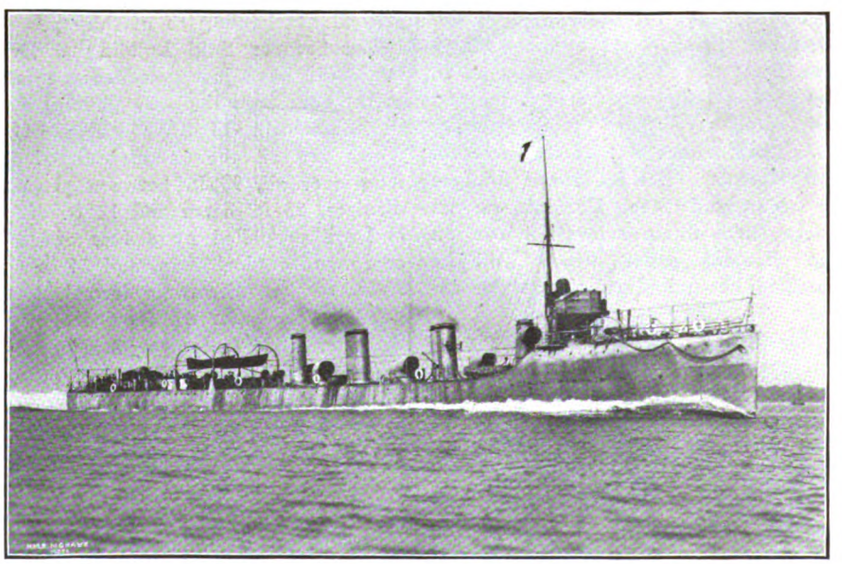
torpedo-boat destroyers deserve special mention. The speed of 33 knots is an exceptionally high one under any conditions, but with the stipulation for this speed being maintained over a period of six hours, combined with heavy scantlings of hull and machinery, and with strictly limited consumption of fuel, it becomes a problem of some considerable difficulty. Messrs. R. and W. Hawthorn, Leslie & Co., have had great success with high-speed destroyers, having built and engined a large number, representing specimens of all types at present in use. Further, they built the Viper, Velox and Eden, which were the earliest turbine boats ordered by the British admiralty. The Ghurka, one of the new type referred to, intended for open-sea work, has just completed her trials. In the full power trial a speed of about a knot in excess of that specified in the contract was obtained, the speed over the whole period of six hours was 33.91 knots per hour, while the mean of six runs over the measured course during the fourth hour gave a speed of 34 knots, and the highest mean speed on the measured mile was 34½ knots. There is little doubt that had the quantity of oil per square foot of heating surface not been restricted, a speed of over 34 knots could have been easily maintained during the six hours. The conditions laid down by the admiralty, which have to be fulfilled on the 24 hrs. consumption trial, are that the vessel should have a radius of 1,500 miles at a speed of not less than 13 knots per hour. The Ghurka more than realized these conditions, and has proved herself to have a radius of action of 1,715 knots at a speed of 13½ knots per hour. If what are known as the Peace tanks are also filled, she is capable of steaming almost 2,500 knots without a stop, which is equivalent to a voyage across the North Atlantic to Canada. This is a much larger radius of action than any other vessel of the type has yet attained.

This trial was completed on Nov. 29, after which the vessel proceeded to Sheerness, took in oil fuel and sailed for the Tyne on the morning of Nov. 30 at 8 o'clock, arriving off Tynemouth piers, a distance of 270 miles, at 6 P. M., thus reaching home sooner than could be done by railway from Sheerness to Newcastle, a continuous speed in a moderate sea of 27 knots being comfortably maintained with four-fifths of her boilers.

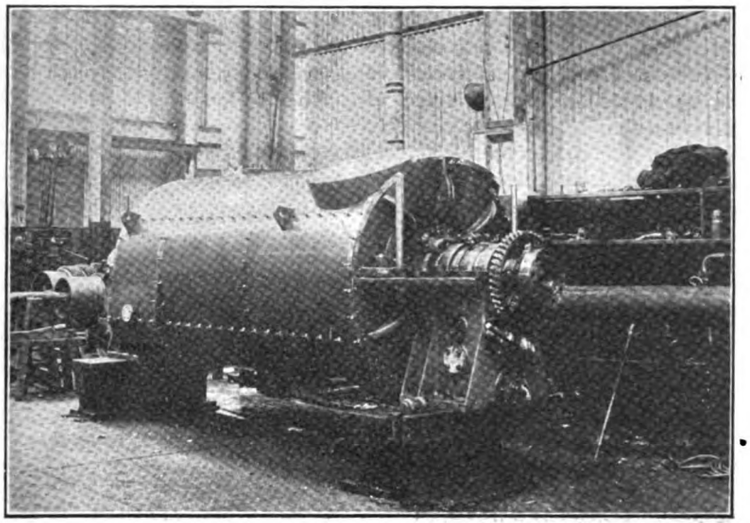
Messrs. Hawthorn, Leslie & Co. have achieved these results with boilers burning oil fuel which has recently been introduced into the British navy. The Ghurka's dimensions are: Length, 255 ft.; breadth, 25 ft. 6 in.; and displacement, 864 tons. Her armament consists of three 12-pounder quick-firing guns, one on each side of the forecastle and one on a platform aft, and she has also two torpedo tubes. The vessel is fitted with turbine machinery of the Parsons type, which has been constructed by the builders. There are three propeller shafts, on the center one of which a high pressure turbine is fitted, while on each wing shaft there is a low pressure turbine, and, in addition, cruising and astern turbines. The vessel proved herself to be easily maneuvered ahead and astern. The cruising turbines are used for economical steaming at sea. The boilers, five in number, are of the latest improved Yarrow type. They are specially fitted with oil-burning arrangements and have proved that boilers of this type are equally efficient when burning either oil or coal.

ANOTHER 34½-KNOT TURBINE DESTROYER.

Messrs. J. S. White & Co., East Cowes, Isle of Wight, have just put through her speed trials the new high-speed ocean-going torpedo destroyer Mohawk, and the results indicate that she is one of the fastest war vessels

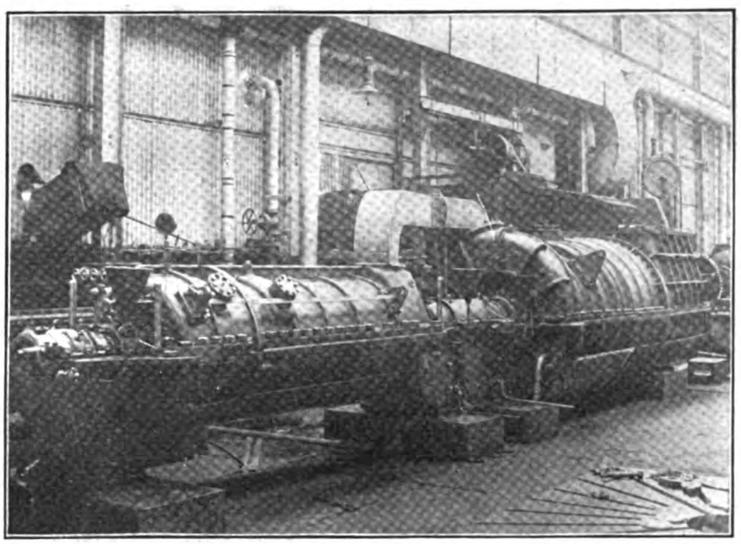


TORPEDO BOAT DESTROYER TRIAL RUNS AT 34½ KNOTS.

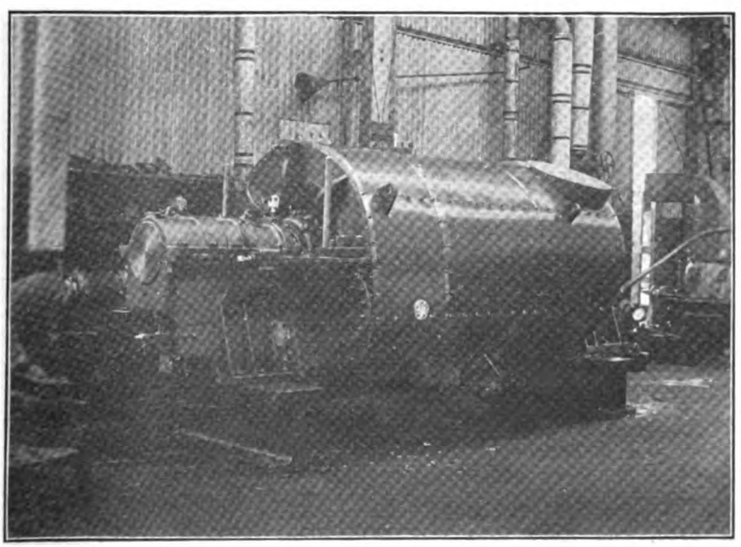


HIGH-PRESSURE TURBINE OF MOHAWK.

in the world. The Mohawk is one of five ocean-going destroyers ordered at the end of 1905, and intended to have a radius of action of about 2,000 miles at cruising speed, while her contract speed is for 33 knots. It is stated that she maintained for the six hours of her trial run a mean speed of 34¼ knots, while on six runs over a measured mile the mean speed was 34½ knots, equal to 40 miles an hour. The Mohawk, like the Ghurka and other vessels of her class, is propelled by turbine machinery, comprising five turbines—three ahead and two astern—driving three shafts and propellers, the power of the machinery being equivalent to about 14,000 I. H. P. There is one high-pressure turbine on the center shaft, exhausting into two low-pressure turbines on the wing shafts, the astern turbines being incorporated with the latter. Ahead of the low-pressure turbines on the wing shafts is a high-pressure and low-pressure cruising turbine, each turbine driving a shaft with one propeller. The steam is supplied by six water tube boilers, each of about 2,400 H. P. of the White-Forster type, made by the same firm. These boilers are fired by liquid fuel, of which she can carry 73 tons, and no coal storage is provided. Her length is 270 ft., her beam 25 ft. her draught 8 ft., and her displacement 765 tons.



HIGH-PRESSURE CRUISER AND LOW-PRESSURE AND ASTERN CYLINDERS OF MOHAWK.



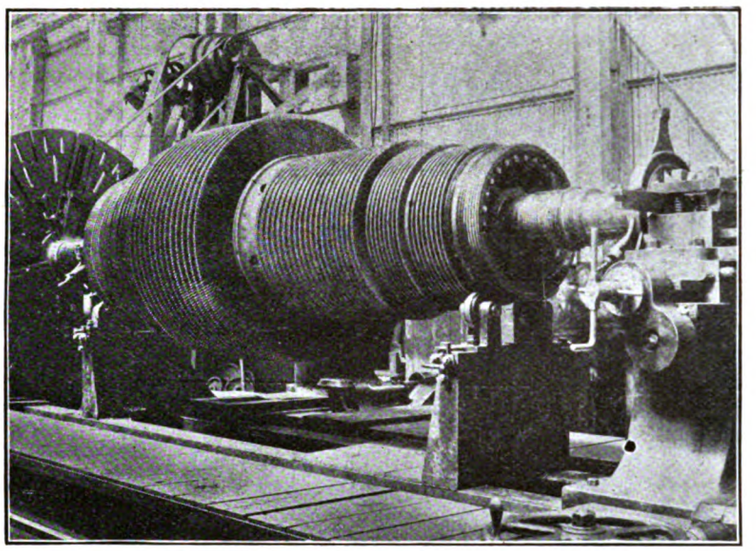
HIGH-PRESSURE TURBINE OF MOHAWK.

A BRITISH 36-KNOT NAVAL VESSEL.

Messrs. Cammell, Laird & Co. on Dec. 7, launched from their Mersey ship building yards a torpedo boat destroyer which is designed to attain a speed of 36 knots an hour, and will therefore be the speediest boat in the world. She was named Swift and her principal dimensions are: Length, 345 ft.; breadth, 34 ft.; depth, 20 ft. 4 in. with a displacement at her mean load draught of about 1,800 tons. She will be driven by four turbines, and steam will be generated by oil fuel. The Swift when completed will prove a most important and valuable addition to the British navy, combining as she does by reason of her increased dimensions, speed, sea-going and sea-keeping qualities, advantages over any other type of destroyer. It may be pointed out that the Swift, although only 1-20th the size of the Lusitania or Mauretania, possesses one-half the horsepower and 7,000 more horsepower than the battleship Dreadnought.

THE BRITISH ADMIRALTY AND OIL FUEL.

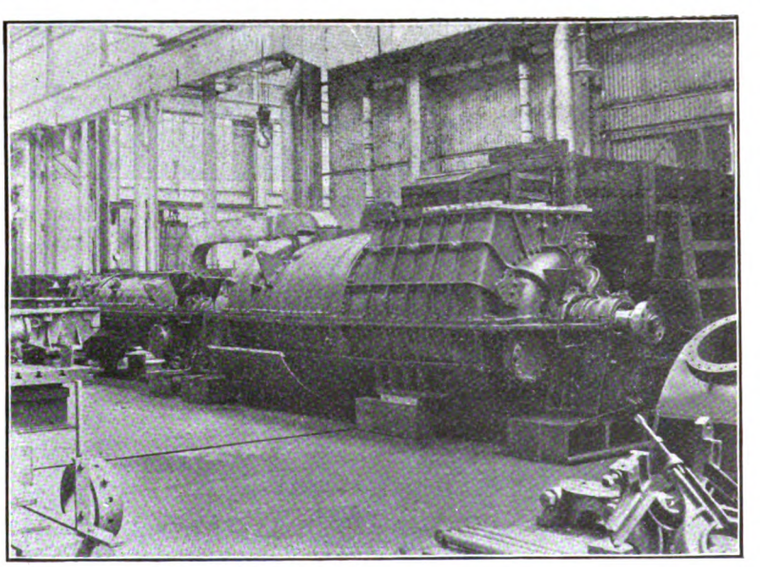
As showing how deeply the British admiralty are now committed to the use of oil as fuel, it may be mentioned that depots for storing it in drums and tanks ready for the use of destroyers are to be formed at, at least, a dozen ports round the British coast. When the scheme is complete there will not be a port at which destroyers may call without its supply of liquid fuel. Another development is the converting of some of the obsolete battleships into oil tanks for use here and there along the coast. Then there are barges building in which the oil can be transported to the depots, and these are to be supplemented by merchant vessels, a list of which, suitable for oil-carrying, is now in preparation. There is even talk of the admiralty eventually building a fleet of oil ships to bring the fuel direct from the new fields in Africa, over which the government has acquired an option. This would mean a saving of money, and that the navy would be independent of private firms for the supply of its liquid fuel. Altogether the scheme is a very important one, for the fuel of the future will be liquid.



LOW-PRESSURE AND ASTERN ROTOR OF MOHAWK IN LATHE.

WHAT OIL FUEL WOULD SAVE ON THE BIG CUNARDERS.

A great authority on oil fuel, and a patentee of one of the systems in use in Britain, namely, J. J. Kermode, M. I. M. E., has made some interesting observations on the use of oil fuel on vessels like the new Cunarders. He says: It might be of interest to many readers of the MARINE REVIEW to consider what effect the use of oil fuel would have upon the speed of the Lusitania. The following would be among some of the benefits derived from its use: No smoke, the 192 stokers and 120 coal trimmers would be left ashore, and 27 intelligent men of the greaser class would be employed to attend the oil burners and regulate the water feed to the boilers. One water attendant and one burner tender per stoke-hole per watch would meet all needs. There would be available accommodations for, say, a further 250 third-class passengers, some 600 tons of oil fuel per day would accomplish more than the 1,000 tons of coal per day now used, and 2,000 tons less fuel would be necessary per trip from land to land. Presumably the Lusitania carries coal for the double trip, out and home, and in that case 4,000 tons less fuel might be carried if oil were used, and cubic space representing this saving of weight could be utilized for merchandise and for the earning of dividends. This is on the assumption that the vessel utilize her present bunkers for oil fuel, but as a matter of fact, the oil fuel could be carried in the double bottom and serve as ballast, and on one compartment being emptied of oil fuel, sea water could be admitted to preserve the trim of the ship, if it was desirable. In this event the whole of the existing bunkers would be made available for cargo. When coal is used for fuel the fires become clinkered up periodically, and there is also the inevitable disposition of soot in the boiler tubes. The Lusitania has 192 fires to produce 68,000 I. H. P. and on the assumption (a very fair one) that 32 fires are cleaned every watch (say 12 hours after leaving Queenstown) it will be seen that about 10,000 I. H. P. is lost every four hours through the operation of burning down and cleaning fires alone. It is difficult to find regular stoking where so many men are employed some of whom may be sadly inefficient as stokers. Irregular stoking will account in some cases for as much as 10 per cent loss of steam throughout the whole voyage, and added to this there is the steady lowering of the efficiency of the boilers through the disposition of the soot in the boiler tubes. Liquid fuel and automatic stoking would ensure steady steam (that is steady rate of pro-



HIGH-PRESSURE CRUISER AND LOW-PRESSURE AND ASTERN CYLINDERS.

gression) from land to land. The efficiency of the boilers would be unimpaired, because always in a state of cleanliness. From an approximate estimate of the several factors which go to determine a speedy voyage, it is safe to say that the use of oil fuel would diminish the time necessary to accomplish the voyage by eight hours. Other factors for the ship owners' consideration are as follows: It takes 35 men 2½ hours to put 80 tons of coal on board a liner from lighters. As against this, a steam pump can put 300 tons of liquid fuel aboard in 1 hour, silently and cleanly. The whole army of lightermen, coal heavers, firemen, and coal trimmers, who are at present the bane of an engineer's life, would be dispensed with for sea-going purposes, and they would find more congenial employment under better conditions of life as "longshoremen" handling the extra cargo on every voyage.

NAVAL ARCHITECTS AND MARINE ENGINEERS

In the MARINE REVIEW of Dec. 12 was published the discussion at the annual meeting of the Society of Naval Architects and Marine Engineers upon Prof. W. S. Leland's and H. A. Everett's paper entitled "Tests on the S. S. Governor Cobb," together with a transcript of the paper. It is a regrettable circumstance that neither Prof. Leland nor Prof. Cecil H. Peabody, of the Massachusetts Institute of Technology, were present to participate in the discussion which ensued, for undoubtedly had they been present the paper would have been stoutly defended. However, they have now transmitted to the REVIEW their contribution which under the rules of the society and by the customary amenities of discussion will be incorporated in the transactions of the society. Their contributions follow:

COMMUNICATED DISCUSSION.

C. H. Peabody: One of the desiderata for our society is an interested discussion of articles and this is sometimes lacking; the discussion of the article in question showed no defects in this line and from the earnestness of the participants it is evident that the discussion cannot be characterized as academic, as so much of the consideration of work done at technical schools is accused of being.

The authors of the paper are entirely able to take care of the technical matters under discussion, and in particular can furnish answers wherever matters of fact are in question. Both have had sufficient experience in our own laboratories and on shipboard to warrant that whatever they undertake will be well and accurately done. In particular, Prof. Leland has had so large an experience in tests at sea, relating to the performance of ships and their propelling machinery, as to insure that nothing would be overlooked or unprovided for.

The authors had entire charge of the tests on the Governor Cobb and should have all the credit for the work and its results, but nothing was done without my knowledge and approval and I am entirely ready to assume responsibility for anything in the paper. From my own personal knowledge of the arrangements on the ship and the ability of the experimenters I know that the data and results are substtantially correct and feel justified in demanding that they shall be accepted as a valuable contribution to our knowledge of this new and difficult branch of marine engineering. This view is substantiated by the fact that some of our leading builders have been glad to receive information in advance of publication and have even shown impatience at our delays.

There are two matters that appear in the discussion that concern the credit of the Massachusetts Institute of Technology, and against which I vigorously protest.

Mr. Winship expresses his opinion that the engineers of the ship were "fooling" these "college fellows." After what I have said concerning the competence of the authors I might pass over this matter, but it seems to me distinctly unfair to make such an accusation against the engineers of the ship who are not members of our society, and cannot defend themselves, not characterize the accusation by harsher terms.

I have a wide acquaintance with sea-going engineers and it cannot be necessary to say to members of this society that I have found them as a class, to be men of great ability and integrity with a high sense of professional honor. The engineers of the Governor Cobb are in the front rank of their profession and showed a most intelligent interest in our work and great zeal in furthering the prosecution of the tests. They gave us every facility in their power.

My friend, Mr. DuBosque, suggests that the defects that were alleged against the paper were due to the difficulty of getting favorable conditions during a service test on a merchant ship. The tests were indeed limited by the conditions that they must be carried out without interfering with the service of the boat; such limitations are necessarily inherent in all service tests; there were no other limitations.

I regret that Mr. Fletcher injects into the discussion a personal matter in which there appears to be room for a difference of opinion. Mr. Fletcher says in his discussion, "Some months ago we received a letter from Prof. Peabody, stating that he intended to make a test of the Governor Cobb, and requested that we loan him the lines of her hull. This we declined to do for business and other reasons, but stated in regard to the test that we would be very glad if he would let us know when the test was to be made and to give us two or three days' notice and we would have a representative on board at the time of the test. Evidently our refusal to loan the lines of the hull was very disappointing, for we received no reply to our letter from him or from any of his assistants, neither did we receive any notice of the test."

I did indeed ask Mr. Fletcher for certain information concerning the ship, with the direct statement that it would be considered confidential if he could supply it. I do not hesitate to say that I was disappointed not to be able to get this information which would have given our tests the completeness that so many of those discussing it have demanded. But I understood entirely that Mr. Fletcher must determine how far his loyalty to his company would allow him to go and I did not question his decision.

In his letter he made the following statement verbatim et literatim.

"At the time that you make the test, if you so desire, I will send our outside engineer to be with you to give you whatever assistance you may require. I would thank you, however, to notify us a few days ahead, so that we can make suitable arrangements."

Nothing else was said about the matter in the letter.

After consultation with the engineers of the boat and discussion among ourselves there appeared to be no necessity of appealing to Mr. Fletcher. *They*

felt competent to handle the machinery under service conditions and *we* had no question of our ability to carry on our work.

If Mr. Fletcher desires to co-operate with us in the future in making tests on any machinery installed by him I have no doubt that satisfactory arrangements can be made and in such case I am confident that we can convince him that our results are reliable and valuable.

COMMUNICATED DISCUSSION.

Walter S. Leland: It is much to be regretted that the authors of this paper were not present to reply verbally to the discussion, and to point out the one or two alleged discrepancies which furnished the groundwork for a few severe criticisms. Nevertheless these are all so simple and manifest on the face of it that I wonder how any engineer or layman either should fail to place on them the proper interpretation.

One of the general charges against this paper seems to be that it is misleading; and yet although I have carefully been over the discussion I fail to find a single point definitely mentioned as misleading excepting the statement of horsepower and results dependent thereon.

In preparing the paper the authors assumed that everyone would know the fundamental difference between the determination of power on a turbine and on a reciprocating engine but for the benefit of those unfamiliar with engine tests let me say that the power of a reciprocating engine is universally indicated and everyone so understands it unless otherwise stated; but no one has yet been successful in "indicating" the power of a turbine.

To make this point absolutely sure however, Capt. Hovgaard, at the request of the authors, made this point clear when he read the paper.

Those who sent written criticisms were perhaps justified in asking the question, but how in the world any one who was present could fail to understand it, I do not see, and yet Mr. Wheeler, after assuming an improper auxiliary consumption for the Nantucket compares 16.5 pounds of steam per I. H. P. for the Nantucket with 19.74 pounds per B. H. P. for the Cobb, and then he says, "It is a pity that these figures are not more complete, because they are very misleading." Mr. Wheeler is right, it is a pity that his figures are so misleading.

Had Mr. Wheeler carried his guesses further and assumed a ratio of 85 per cent between indicated and brake horsepower he could have compared $\frac{16.5}{0.85} = 19.41$ pounds for the Nantucket with 19.74 pounds for the Cobb.

But what is the use of guessing, and where did Mr. Wheeler get the 15 per cent for auxiliaries? The reported data show a little less than 11.2 per cent for the Cobb and not 15 per cent as he says. If the auxiliary consumption on the Nantucket was a like per cent, then he should have compared 20.28 pounds for the Nantucket with 19.74 pounds for the Cobb.

The authors failed to draw any such misleading comparisons because it is all founded on assumption and they preferred to let every member do his own assuming. The auxiliary consumption for the Nantucket was not given because we had no accurate means of determining it as we had for the Governor Cobb.

After reading the discussions of this paper one is likely to get the impression conveyed in the words of Mr. Platt, "that this paper is absolutely misleading, certain data has evidently not been taken, and the data which has been taken is not correct in very many particulars, and in the particulars in which it has been taken is so far from correct, so much so, that I do not think this paper ought to be printed in the proceedings of this society."

This is a pretty broad statement and one that is absolutely untrue, evidently uttered with the intention of throwing discredit on the paper. To characterize it more concisely would be a violation of parliamentary language. The only reply I need make, is to say that John Platt Esq. was not on board the Governor Cobb at the time of the test, at any rate he was not in the engine room, and therefore has no knowledge of our work in any particular. I cannot help wondering at the assurance of a man who, under those conditions, says that our data are not correct.

The paper contains no false statements and therefore cannot be as misleading, for instance, as his own remarks.

He says the paper is incomplete and yet the only omission he definitely refers to are "turbine particulars" and "turbine pressures." By "turbine particulars," I presume he means dimensions, etc. This data fortunately, the Parsons Co. do not seem to be inclined to give out and the turbine pressures would be of little value of themselves. As Mr. Speakman says in his admirable article in the Transaction of the Institute of Engineers and Ship Builders of Scotland, Vol. 49, "Being, however, based on long and costly experiments, much reticence is observed in their publication."

On reading Mr. Anderson's discussion one finds the cause for much of the alleged misleading character of the paper. He quotes, "The best run was made ..... under the most favorable conditions of weather and sea" and then goes on to prove that this could not possibly be so because the boilers were dirty, the boat having left Boston eight hours before it left Portland. This was really an unexpected line of attack and one for which the authors were entirely unprepared. I have looked into his argument carefully, but have not yet discovered how to answer a man who infers that dirty boilers have a detrimental effect upon the weather and sea. If the paper was not sufficiently clear I trust that this explanation will not be misleading.

For Mr. Anderson's information I would say that the 2 in. air pressure was because of dirty fires and not dirty boilers.

At the very top of the advance copy of the paper one may read, if he chooses, these words. "This paper having been received by the secretary at a very late date....., has been sent to members of the society *without proof reading*, in order to save time," and yet apparently no one saw them. For instance, Mr. Anderson made a great point of the fact that the revolutions of the center shaft were stated as 400 in the paper while the curves on Plate III did not go anywhere near 400. Mr. Anderson certainly ought to have seen that this was clearly a clerical or typographical error and should have read 450, as distinctly shown on the curves he referred to. The correct revolutions are 475, 460 and 450 as stated in the paper and not those assumed by him.

His failure to comprehend explicit statements in the paper is again shown by his assumption of 440 for the *average* revolutions of the center-shaft, when it is definitely stated that the 4,100 horsepower is based on maximum revolutions, which the curve clearly shows to be 450. Then he says, "the horsepower as calculated by the formula given at the top of page 2 shows a discrepancy as the revolutions for the center shaft were taken at 400 instead of 440, so that 4,100

horsepower should be 4,300. That alters the water consumption."

This is absolutely wrong in every particular. Four hundred and fifty was used in the computation for maximum horsepower and not 400 as he states. Moreover, it is evident that Mr. Anderson either does not figure out his 4,300 horsepower or else he made a grievous error in his arithmetical work. The discrepancy is his, and the rate of water consumption would not be altered anyway because it is definitely stated that this rate is figured on *average* horsepower (3,747) and not on the *maximum* (4,100) as he supposed.

Thus, these three discussions fall absolutely flat, the last two containing not a single sound suggestion. It is no wonder that these gentlemen were misled.

Many of the critcisms offered are worthy of careful explanation, but these unfortunately are not the ones that attracted the most attention at the meeting.

To the charge of incompleteness we must, in a measure, plead guilty for we are aware that very little data is given concerning the vessel, and none at all of the propeller or turbines, but after reading Mr. Fletcher's discussion the reason for these omissions ought to be apparent to every one, but these omissions do not in any way affect the accuracy of the test or of the results reported, nor does it make our *observations* any the less complete. He criticizes us severely for not giving the draught and trim of the vessel, but evidently he did not read the paper very carefully for the draught *is* given on page four.

As to preparations for the test there is little to be said. The test was run on a regular trip of the boat, under service conditions, and it would hardly occur to any one of experience that this bore any direct relation to trial trip conditions. The boat had just been overhauled for the summer's work and the test was run on her second trip thereafter. Mr. Fletcher says, "Engineers in general will think it her best performance." Perhaps they will but if they do it is no fault of ours, and we cannot be responsible for the opinions of supposedly intelligent men who misconstrue plain English or who jump at erroneous conclusions. Engineers are supposed to be familiar with service conditions.

Mr. Fletcher questions the evaporation figures per pound of coal and endeavors to show that if these are in error then the steam consumption is in error. This is certainly an unexpected conclusion and one that is absolutely groundless and misleading. On reflection we are inclined to believe that Mr. Fletcher is too good an engineer to be misled by his own conclusions, but for the benefit of others I want to say that the evaporation of those boilers is correct. I read the meter myself at the beginning and at the end of the test and checked the readings at frequent intervals. The meter, moreover, was calibrated under my personal direction and I know whereof I speak. Those boilers on the Governor Cobb evaporated 183,376 pounds of water in four hours.

If one chooses to question the coal consumption he is at liberty to do so. I did not count the buckets myself but I made frequent trips to the boiler room and coal bunker. The method of getting coal is definitely stated, the result, therefore, is *not* misleading and the worst any fair minded man can say in regard to it is that the method is not one of precision, but even so it is the boiler test and not the turbine test that is affected by the coal.

It is true that we could not twist the shaft to determine its modulus of elasticity but from a large number of tests it has been found that 11,600,000 is a fair mean, the variation either way being usually less than 3½ per cent. Assumptions, as Mr. Fletcher says, may *sometimes* be wrong but he has no objection to accepting the records of the ordinary steam engine indicator which we know is *always* wrong and frequently subject to an error as serious as that mentioned above.

The log was not towed over a measured mile at a speed of 18 knots, it is true, but a progressive speed trial at lower speeds showed practically a constant error. The log was towed from the end of a 20-ft. boom both times. It is inconceivable that the rate should hold, up to say 16 knots, and then suddenly fall off and we do not believe that it did, but right here let me say that the determinations of speed and coal were not considered the essential features of the test. What we wanted to find out was the steam consumption of the turbine under *service conditions* and we found it.

Mr. Fletcher makes a point of the fact that our results do not agree with his own. He says that at 459.3 revolutions he obtained a speed of 18.12 knots, but he does not say how he obtained the speed, nor does he give any information by which one may judge of the probable accuracy of his result, and he fails to give the draught and trim. It is, therefore, difficult to compare the results, but it is hardly to be expected that the boat carried cargo on her trip from the builders' yard to Boston.

At 459 revolutions our curve shows a speed of about half a knot less than Mr. Fletcher gives, all of which could readily be accounted for by a difference of 1 ft. in the draught, and the boat at that time was fresh from the builders' hands. Mr. Fletcher has made a considerable demonstration only to help prove in the end that our results are just what might have been expected under the existing conditions and that they check admirably with his own.

Both Mr. Taylor and Mr. Fletcher object to the form of speed curve, but as the curve itself is no part of the original data every one is free to plot for himself. It is too much to expect that every point will fall on a fair curve, or that everybody would plot exactly the same curve, through those points.

If the speed at 443 revolutions were half of one per cent less and at 463, one-half of one per cent greater, a fair curve could readily be put through these points of a shape doubtless more satisfactory to all concerned—but its departure from the original curve would be very slight and half of one per cent is a small matter any way and might exist even on a measured mile trial.

If a straight line should be drawn from the origin of the curve on Plate II at 45° to the base line, it would cut the 450 revolutions ordinate at 18 knots, and would pass fair through the three lower points of the curve. If there were no loss of propeller efficiency whatever this straight line would show 18.33 knots at 459 revolutions so that Mr. Fletcher's own figure, 18.12 knots, shows that the propeller begins to lose efficiency somewhere in the vicinity of 17 to 17½ knots.

If it is true that all our points are too low, then his curve would be more precipitous than the 45° line, and the falling off at 459 revolutions would be relatively greater and the loss of efficiency would begin earlier than 17 to 17½ knots, perhaps as early as 16½ knots and yet he criticises our curve severely because as he says it begins to fall off at about 17 knots. It is evident to us and must be to any one that this really is a very close agreement between

these two sets of results and it is much to be regretted that if Mr. Fletcher has the curve and data he speaks of, that he should not find it possible to publish them, for then a direct comparison could be made and he would have something to substantiate his statements, while now we are asked to accept them unsupported as they are by a single scrap of evidence.

It should be quite apparent to any one that the turbines were not doing their best so far as revolutions were concerned, but we have distinctly stated that we wanted service conditions and we got them.

For the benefit of Mr. Winship, I would say that the 27 in. was not the reading, but the correct vacuum, after deducting an error of approximately two inches from the ship's gages. It was not convenient to check these gages before the test and therefore the error was not known at the time. All gages furnished by the Institute of Technology, and several that were loaned by the Crosby Steam Gage & Valve Co., were tested both before and after the trip.

If a much greater vacuum is to be obtained on the Governor Cobb it would certainly be necessary to reset the gage hands, for with the pointers hovering around the 29-in. mark, the engineer is not likely to speed up the air pump to any great extent. It is possible that an error similar to that affecting the gages of the Cobb also affected the gages of the Harvard, at the time Mr. Winship found 29½ in. vacuum. It is also interesting to note that readings of the boiler gage on the Governor Cobb had to be corrected approximately seven (7) lbs., but the engineers had apparently not suspected it.

We are gratified that such men as Mr. Taylor and Mr. Burleigh were able to put upon our results the same interpretation that we ourselves placed. The results, while evidently falling below the expectation of some of our members, are pretty closely in line with results reported from abroad and are not unfavorable to the turbine as compared with the reciprocating engine.

To conclude let me say that the charges of incompleteness are manifestly unfair, the charge of misleading untrue, and the charge of inaccuracy absolutely false. A man who jumps at conclusions that are not justified, or one who fails to comprehend definite distinctions, or one who does not figure correctly, is very likely to be misled by his own errors and should be very careful how he discusses such a paper as this.

In behalf of the authors, I wish to assure the president that their "castigation" *was* taken in good part and that they feel honored that the society should have devoted so much time to this paper.

ATLANTIC COAST GOSSIP.

Office of the MARINE REVIEW,
1005 West Street Bldg.,
New York City.

Trans-Atlantic passenger travel, both east and westbound, has increased to such extent that the year 1907 shows nearly double the figures for 1904. The passenger movement for last year was 972,640 greater than for the year 1906. The westbound, or travel from Europe to the United States, reached a total of 1,699,340, which is 200,000 in excess of the combined east and westbound travel for 1904. Eastbound travel for 1907 consisted of 1,257,328 persons, the increase being apparent in every class. The eastbound steerage rush, which occurred during the last two months of 1907, was mainly responsible for bringing the total steerage figure for that year to 550,045, whereas the westbound steerage numbered 1,364,688.

The annual report of the Panama Railroad Steamship Co. shows a loss from operations for the fiscal year ended June 30 of $37,158. For the four months of this fiscal year to Oct. 31 the deficit has been $64,101. The Government Steamship Co. runs in competition with several lines to the Isthmus, its principal competitor being the Hamburg-American Steamship Co., which has a regular line of steamers sailing weekly from New York to Colon and South American ports.

The Cunard liner Pannonia, while laboring in a severe westerly gale encountered on the voyage from the Mediterranean to New York, was hove to while the surgeon, with the assistance of a surgeon passenger, performed an operation for appendicitis on one of the steamship's coal passers. Methods of cure without an operation had been resorted to, but the man's condition became such that an immediate operation was imperative. To allow the surgeons to work, the big liner was stopped for one hour.

The British steamship William Cliff, which successfully towed the disabled steamship Cambrian more than 1,000 miles, has arrived at Liverpool. The Cambrian was picked up in mid-Atlantic, on Dec. 16, with a broken shaft, and after experiencing considerable trouble through the hawsers parting, was eventually towed to Crookhaven.

The Sicula Americana Steamship Co., of Messina, controlled by William and George Pierce, of the firm of Pierce Brothers, who are also owners of the steamers employed in the service under the Creole line, of which Hirzel, Feltmann & Co., 11 Broadway, New York, are the agents, have appointed that firm general agents of the Sicula Americana Steamship Co. The company now maintains a fortnightly service from Naples, Messina and Palermo to New York, and handles an extensive passenger and freight trade.

Steamers arriving at New York have reported sighting, near Barnegat, N. J., the mast of a submerged schooner. A vessel's yawl which came ashore at the Harvey Cedars life saving station showing signs of having been hastily cast off, gives further evidence of a disaster at sea off that point. A five-masted schooner, with foresail hanging over the side and jibboom broken, has also been reported in the vicinity of Barnegat.

Captain T. A. Curtis and crew of the schooner Thomas A. Ward wish to extend their thanks to the captains and officers of the following vessels: Schooners Amazonense, Apache and Judge Pennewill for their kindness and timely rescue from the waterlogged schooner Thomas A. Ward.

The Regina D'Italia, of the Lloyd Sabaudo, against which was an attachment for $1,057,690 was filed recently, sailed last Saturday for Italian ports. Vice Consul Cesare Conti, general agent of the line, filed a bond to secure payment of the attachment.

The attachment was obtained by Hugh Laing, agent of Sir James Laing & Sons, Ltd., ship builders, England, the papers stating that the money is due for vessels built by the firm for the company under contract of Aug. 6, 1906, with interest from that date.

The Thomas W. Lawson has been abandoned by the London Salvage Association, as it has been found impossible to save the big schooner. The entire cargo is also a dead loss.

Because of the demand for facilities at Boston, plans have been prepared at the navy department for a third dry dock at the navy yard, the dock to be 500 feet long with beam and depth sufficient for any vessel.

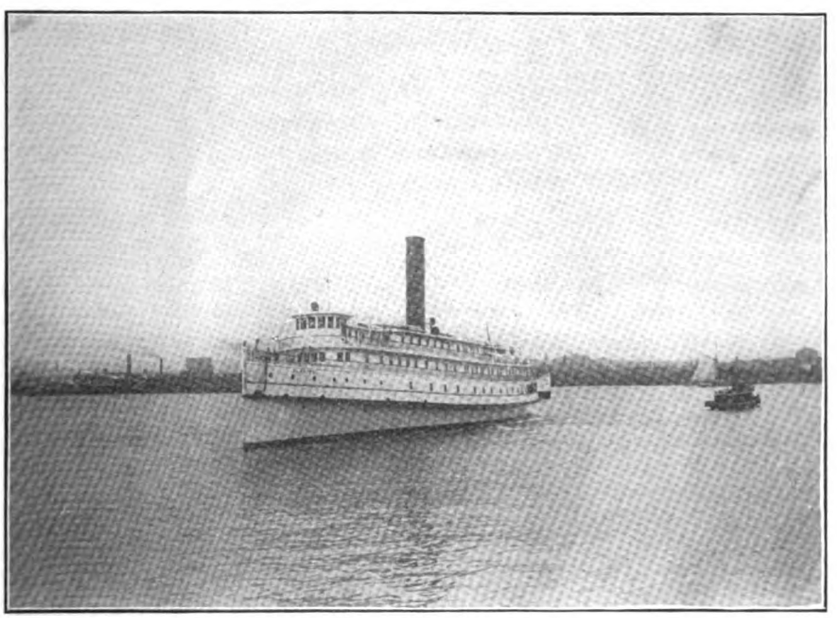
The Gloucester schooner fishing Agnes V. Gleason was wrecked on Bantam Ledge, Me., on Monday, while making for Boothbay harbor, and will probably be a total loss. Capt. Gilman Gal-

lant and his crew of 14, rowed six miles in their dories to Boothbay.

On Tuesday the Canadian Pacific railway steamer Mount Royal, which left Antwerp on Dec. 7, was a week overdue. She has a large cargo and over 300 emigrants, and it is feared that she has met with some accident to her machinery.

STEAMER FLORIDA.

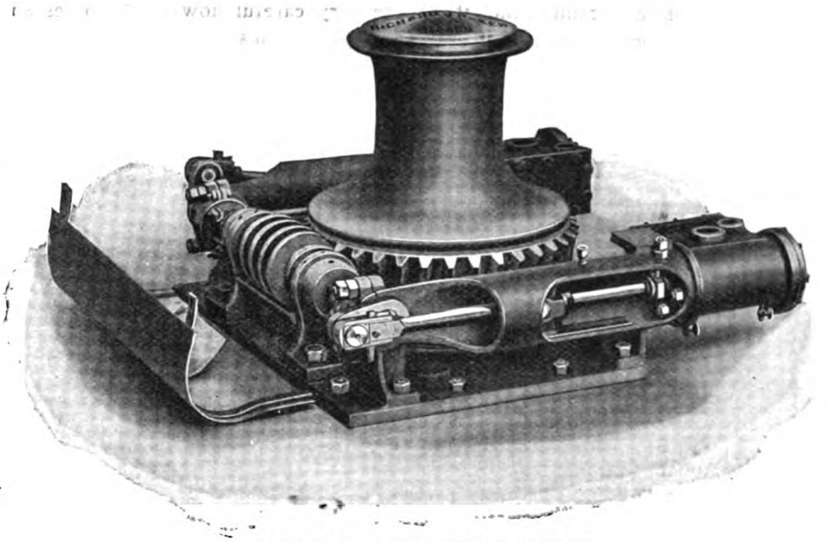
The Maryland Steel Co., Sparrow's Point, Md., recently completed the steamer Florida for the Baltimore Steam Packet Co. The Florida is a steel steamer, and is 306 ft. over all; 296 ft. 2 in. between perpendiculars, 41 ft. beam at water line, 56 ft. deep over guards, 18 ft. molded depth. Her machinery consists of a 4-cylinder triple-expansion engine with cylinders 24½, 40, 47 and 47-in. diameters by 42-in. stroke, and four Scotch boilers, 13 ft. 2 in. diameter by 11 ft. 3 in. long, allowed a working pressure of 175 lbs. Excellent taste is displayed in the interior decorations of the Florida, her social hall being finished in mahogany, the ladies' saloon in quartered oak, and the upper saloons in soft wood painted with mahogany pilasters. Paneling throughout is in the Queen Anne style. The speed of the Florida is 17½ knots, and on her trial trip her indicated horsepower was 2,550.



STEAMER FLORIDA OF THE BALTIMORE STEAM PACKET CO.'S FLEET.

DOCK STEAM GYPSEY.

The American Ship Windlass Co., Providence, R. I., has recently brought out a new type of dock steam gypsey to meet a certain demand for a gypsey on board vessels where it is impossible to get room enough under the deck to place an engine, as for instance on tugs. In a great many tugs, especially small ones, the space under the stern deck is occupied by a tank, and in other tugs, the sheer of the underside of the stern is so flat that it does not allow head room enough to place the engine between the deck and the hull. This machine, as will be observed, combines the engines around the worm gear so that the whole machine is self-contained and is readily installed on top of the deck. The company has installed a number of these gypseys on tugs and they have given perfect satisfaction. Aside from their utility on board tugs they are peculiarly adapted for use in hauling cars, moving buildings, setting boilers and other heavy work.



NEW TYPE OF DOCK STEAM GYPSEY.

A representative of the company called on a building mover lately to whom the company had sold one these machines. The machine had only a pair of 4 by 6-in. cylinders, yet the builder stated that he had been using the machine ever since he had bought it for moving heavy buildings and for setting some enormously heavy boilers and engines, and although the machine was small it seemed to have no limit to the load that it could lift by simply putting more parts into the purchase which was used. The company recently sold one of these machines to the R. S. Brine Transportation Co. and it was successfully used for installing engines in the Charlestown station of the Boston Elevated railroad.

PIG IRON SITUATION.

The end of the year finds the iron and steel trade in a condition of not as great an improvement as had been hoped for, but there is unquestionably a more cheerful feeling which is expected to revive operations to some extent early in the new year. A gradual increase of business is noted in pig iron. Prices are being fairly well maintained, though low quotations from aggressive operators are not uncommonly encountered. In the Pittsburg district the only steel mill of the United States Steel Corporation, which has resumed with assurance of permanent activity, is the New Castle, Pa., plant. It is also expected that a number of tin plate mills will resume about Jan. 6. Coke transactions show a tendency toward low prices, a sale of 40,000 tons for first half having been made at the price of $2 ovens.

The Pittsburg Steamship Co. has sued the steamer A. C. Brower for libel as a result of the collision between the steamer I. L. Ellwood and the Brower on Aug. 27.

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FREE SHIPS FOR THE COASTING TRADE.

When the filibustering tactics of two or three senators, defeated for re-election and about to sink into obscurity, prevented congress from enacting the ocean mail law, last March, it was predicted that this victory of the foreign shipping interests would be followed up at the next session by a raid on the United States coastwise laws. This promptly appears in a bill introduced by John Sharp Williams of Mississippi, the Democratic leader in the House, providing for free ships in the coastwise trade between the United States and Porto Rico and Hawaii. This is a long step farther than recent free ship propositions have gone. These have usually provided only for the free registry of foreign vessels for use in the foreign trade of the United States. But Mr. Williams's present proposition would bar out American-built ships from what is essentially domestic commerce.

The Williams free ship bill, which the Democratic leader will doubtless seek to make a thorough-going party measure, is as follows:

Be it enacted by the senate and house of representatives of the United States of America in congress assembled, That upon the expiration of 30 days from and after the passage of this act any American citizen or any corporation organized under the laws of any state of the United States shall be permitted to buy and own and to operate under the American flag any ship purchased anywhere or constructed anywhere, whether in the United States or elsewhere, provided said ship is purchased for and operated exclusively in the trade between the mainland of the United States of America and the islands of Porto Rico and Cuba or between the mainland of the United States and Hawaii or the Philippines, Japan, and China.

This bill is numbered 9,149 house of representatives, and has been referred to the committee on the merchant marine and fisheries and ordered to be printed. It is a gratuitously hostile measure. So far as is known, not one American shipowner has asked for it. The coasting trade with Porto Rico and Hawaii has been almost the only advantage which American shipping has gained of recent years through legislation of congress. This legislation has, in the first place, given Porto Rico and Hawaii better communication with the mainland than they have ever had before, and, in the second place, it has caused the construction of a considerable fleet of first-class passenger or freight carrying steamships in American yards. It has given millions of dollars of employment to American labor.

Before the coastwise principle was applied to Porto Rico, there were no steamships regularly running between the islands and the United States. Now there are three lines from New York, and one or two regularly running from New Orleans. The application of the coastwise law to Hawaii has created the great fleet of the American-Hawaii Steamship Company, American-built steamers every one, and probably the finest fleet of exclusive cargo vessels in operation under any flag on this round world. It is true that the Hawaiian people suffered some inconvenience last summer because of lack of passenger, not of freight, facilities between the Pacific coast and Honolulu. But this was due to two causes. One was the grounding and disabling of the two great steamers Manchuria and Mongolia of the Pacific Mail line, and another, and a cause for which Mr. Williams and all of the men of his party in congress voted, was the abandonment of the Oceanic steamship line from San Francisco via Hawaii to Australasia.

But the way to give Hawaii better communication with the mainland is to build up and not to tear down. If Mr. Williams and his party friends in congress honestly wish to improve the transportation facilities between Hawaii and the American mainland, let them follow the recommendations of the message of President Roosevelt, and vote for the ocean mail bill, with its provision for the establishment of regular American steamship lines not only to South America but across the Pacific ocean.

This free ship bill of Mr. Williams's aims a deadly blow at American labor in favor of the cheap wages of European subsidized and bountied dockyards and the coolie labor of the Orient. A German shipbuilder the other day, visiting one of our Atlantic coast shipyards, found to his surprise that the steel plates, beams and other materials there cost only about a dollar and a half a ton more than similar materials delivered to his own shipyard at a nominal cost for transportation by the state railways of Germany. That is, transportation differences considered, there is practically no difference between the cost of steel.

This means that if there is any difference in the cost of American and foreign ocean ships it is a difference for which the higher wages of American labor are responsible. And it follows that the only way by which the cost of American ships can be reduced to meet such absolute free trade competition as Mr. Wil-

liams now proposes is by reducing the wages of American mechanics. Mr. Williams's bill ought to be entitled "A bill to compel American shipyard workmen to accept the wages prevalent in Germany, Italy or Japan."

In Germany the shipyards are subsidized by the provision that their materials should be hauled at cost on German railroads, and in other ways. France gives direct bounties of so much a ton for the hull and so much a ton for the machinery to her ship builders. Italy does the same. Japan follows the same policy. For every ship built in a Japanese ship yard the government pays a bounty of from eight to twelve dollars a ton and a further bounty for her boilers and engines.

Moreover, Japanese workmen, even skilled mechanics, are laboring in these ship yards for a few cents a day. They are building many ships, for their government not only grants bounties for construction but gives further subsidies and large ones for the maintenance and operation of these steamers under the Japanese flag. If, under the provisions of the Williams bill, these ships were built in Japan and transferred to the American flag for trade between our ports and Porto Rico or our ports and Hawaii, they would not receive Japanese subsidies while so operated. But they would have received Japanese bounties on their construction. These bounties added to the further advantage of the cheap wages of the coolie labor in Japanese yards, would make American competition for the building of these ships absolutely impossible. If Mr. Williams's free ship bill were to be approved by congress, we should see the extraordinary spectacle of American ship yards closed and idle and their workmen starving while American ships for coastwise commerce were being built by the aid of Japanese bounties, by coolie workmen in the shipyards of the island kingdom.

Does Mr. Williams wish to go into the next presidential election responsible for a spectacle like this? Either he does wish this or he has been scandalously tricked by evil counsellors. The shipyard workmen of the United States and their brethren of other trades will demand a hearing and a free and full one before the house committee on merchant marine and fisheries if the Williams free ship bill comes up for consideration. The Democratic leader in the national house of representatives has aimed a savage blow at their very life.

ORE ON DOCK DEC. 1.

The figures compiled by the MARINE REVIEW from the returns sent in by the various dock companies show that iron ore receipts at Lake Erie ports during the season of 1907 were 35,195,758 tons, out of a total movement of ore by lake of 41,288,755 tons. Lake Erie docks on Dec. 1 held a balance of 7,385,728 tons, which is the largest store on hand in the history of the traffic, the previous high figure being in 1902 when 7,074,254 tons were at hand. During 1906 the total shipment by lake was 37,513,595 tons, of which Lake Erie docks received 32,076,757 tons and held a balance on Dec. 1, 1906, of 6,252,455 tons. During 1905 the total shipment by lake was 33,476,904 tons, of which Lake Erie docks received 28,941,259 tons and held a balance on Dec. 1, 1905, of 6,438,967 tons. The reserve of 7,385,728 on Lake Erie docks Dec. 1 is ample for winter consumption. Never in the history of the trade has 5,000,000 tons gone forward from dock to furnace during the winter season, and moreover, furnace stock piles are abundant.

Shipments to furnaces between May 1 and Dec. 1, 1907, aggregate 29,787,018 tons compared with 27,615,392 tons in 1906, compared with 24,311,720 tons in 1905, with 16,658,806 tons in 1904, with 16,903,013 tons in 1903, with 18,423,364 tons in 1902, and with 14,204,596 tons in 1901.

The shipments to furnaces during the season of navigation as referred to are determined in this way: First we have the amount of ore on Lake Erie docks before the opening of navigation May 1 last, 1,976,988 tons; add to this the receipts of the season just closed, 35,195,758 tons, and the total is 37,172,746 tons; deduct the amount on dock Dec. 1, 7,385,728 tons, and we have 29,787,018 tons as the amount that was forwarded either direct or from dock to furnace yards. It is, of course, understood that the difference between the total output of 41,288,755 tons, which was shipped from the Lake Superior mines during 1907, and the receipts of 35,195,759 tons at Lake Erie ports, is ore that went to places other than Lake Erie ports, such as the furnaces at Detroit and South Chicago. The accompanying table shows receipts at Lake Erie ports and amounts on dock during six years past:

IRON ORE RECEIPTS AT LAKE ERIE PORTS, GROSS TONS.

Ports.	1907.	1906.	1905.	1904.	1903.	1902.
Toledo	1,314,140	1,423,741	1,006,855	508,792	652,305	1,037,571
Sandusky	83,043	35,847	51,202	48,356	130,532	165,556
Huron	971,430	778,453	825,278	231,364	486,106	520,646
Lorain	2,621,025	2,191,965	1,605,823	972,931	990,490	1,442,417
Cleveland	6,495,998	6,664,661	5,854,745	3,572,228	4,434,160	4,873,318
Fairport	2,437,649	1,861,498	2,008,621	1,157,858	1,434,342	1,538,744
Ashtabula	7,521,859	6,833,325	6,373,779	3,639,250	4,242,160	4,796,805
Conneaut	5,875,937	5,432,370	5,327,552	4,083,655	3,903,937	4,300,301
Erie	2,294,239	1,986,539	2,112,476	1,284,778	1,257,798	1,717,268
Buffalo & Tonawanda	5,580,438	4,928,331	3,774,928	2,433,601	2,194,901	2,356,798
Total	35,195,758	32,076,757	28,941,259	17,932,814	19,681,731	22,649,424

IRON ORE ON LAKE ERIE DOCKS, DEC. 1, GROSS TONS.

Ports.	1907.	1906.	1905.	1904.	1903.	1902.
Toledo	518,645	281,000	368,024	318,573	106,710	310,023
Sandusky	44,546	17,467	52,977	75,134	95,275	95,175
Huron	415,730	245,499	208,023	182,495	253,249	232,767
Lorain	366,271	336,321	271,695	299,504	288,581	328,304
Cleveland	1,281,335	1,224,606	1,330,619	1,237,033	1,337,750	1,500,604
Fairport	523,981	590,783	759,961	660,420	845,946	924,236
Ashtabula	2,056,820	1,631,312	1,589,951	1,403,575	1,911,911	1,967,136
Conneaut	1,090,774	1,057,424	976,976	684,487	591,364	673,679
Erie	652,219	552,631	564,961	583,439	657,469	722,966
Buffalo	435,407	315,412	315,780	318,739	282,890	319,367
Total	7,385,728	6,252,455	6,438,967	5,763,399	6,371,085	7,074,254

JONES STOKER.

The Under-Feed Stoker Co. of America, Marquette building, Chicago, manufacturer of the Jones stoker, report having closed a sale the latter part of December for installing their stokers on board the steamer James E. Davidson of the Inter-Ocean Steamship Co.'s line, G. A. Tomlinson, manager, Duluth, Minn. The steamer Eugene Zimmerman of the Toledo Steamship Co. has been equipped with these stokers since being brought out in 1905 and the results obtained in the way of economy, increased steaming capacity, etc., have been most marked.

"IN THE MERCHANT SERVICE"

"The seafarer," said the First Assistant, by way of carrying on one of these reminiscent conversations which we get into from time to time, "is generally looked upon as inclined to the superstitious, with a tendency towards keeping his weather eye open for omens: bad omens preferred. You will notice that the majority of the old-time sea songs, too, were principally devoted to harrowing descriptions of the foundering of gallant barks, and watery graves. No doubt the introduction of propelling machinery aboardship has considerably lessened the anxiety occasioned by the springing up of a gale, with the accompanying heavy seas and flooded decks. Now, so long as the coffee mill down in the interior

THE FIRST VESSEL SIGHTED WAS AN OCEAN TRAMP.

keeps plugging along, we can gaze with placid eye on the seascape. At any rate, to show that the seafarer can at times be decidedly optimistic, I'll tell you of an incident that came under my own observation."

"Let's have it," we murmured encouragingly.

"Well," continued the First, "several years ago I was one of the engineers on a big intermediate boat in the trans-Atlantic emigrant trade. She had tremendous carrying capacity, and, in addition to freight enough to satisfy three ordinary vessels, could stow away about 1,000 steerage passengers. She was a splendid fair-weather ship, but in a seaway had all the buoyancy of a waterlogged cask. Needless to point out, she was a wet and dirty ship during winter, and, not being fitted with bilge-keels, her capacity for rolling was utterly indescribable. *Roll*—why, she'd roll past the Hook, and come wabbling up the North river to recline wearily against the dockside, utterly worn out."

"Aw, talk about rolling," broke in the Third, "why, I was on an old hooker—"

"As I was saying, when interrupted," continued the First, gazing reprovingly at his subordinate, "this mechanical porpoise was anything but a happy home when the gentle breezes blew our way. We left Liverpool—on this particular trip—some time around Christmas, and crept down the channel in a dense fog. Before we were clear of Daunt's rock we were butting into as dirty a piece of weather as it has been my misfortune to experience, and our troubles were beginning. Our gallant bark was going through her entire program of stunts; rolling, plunging, rearing, taking seas over the head and shaking 'em off at the stern. There was about 6 in. of the Atlantic washing constantly around the decks, which, needless to say, were deserted. The steerage quarters were packed with reeking emigrants, and those that weren't below crowded into the sheltered parts of the decks or lay around in the sea-washed alleyways, too miserable to resent being occasionally trod on by the heavy sea-boots of the hurrying sailors. In our quarters we had everything movable stowed away or lashed with spunyarn. The storm-boards were on the doors—packed with greased spunyarn, too—but the floors of the cabins were always awash. She was certainly a wet ship, inside and out.

"Seldom a watch passed without word being passed around that some part of the deck gear had gone by the board. Two of our lifeboats had been stove in, one of them finishing the trip bottom up on the engine room skylights. We had occasional snow storms, the wind blew fast and fierce, and a coat of ice covered the decks and rigging. Luckily, our box o' tricks below forgot to break down, pounding and rattling through it all, nursed by the Armstrong governor.

"After about seven days of this sort of thing, the gale died down, but 'gigantic waves came rolling on' (which is quite poetical). The sailors turned to on the damaged deck-work and rigging. The emigrants crept forth to stare dizzily out on the long seas rolling up under our bow, no doubt surprised to think that they—with their hide-bound trunks and muzzle-loading guns—were after all to be spared to see the promised land, where the streets are lined with gold and a man can own as many as 12 head of cattle without being in danger of having his throat cut by some less wealthy person. Along about midday the first vessel sighted was reported by the lookout, and presently she hove in sight coming right down on our bow. The news soon spread, and in a few minutes the decks were swarming with excited emigrants. They came scrambling up the companions from the steerage, men, women and children, all getting their first view of the broad ocean, and incidentally the first breath of fresh air they had had since last sighting land.

"As the stranger approached we saw at a glance that she was an ocean tramp, the trampest kind of tramp, too. She could never have created a favorable impression, even if she had wanted to, and her paintwork wasn't beyond reproach. Originally all one color—black—she might have been passable, but certain parts of her rusty hull had recently received a coat of red oxide, giving her the appearance of a crazy-quilt. Two lifeboats were at their davits, also painted black, the davits being so badly twisted that they would have been useless in a case of emergency. The only human being in sight was peering at us over a very dirty and patched screen on the bridge, and she was withal the most forlorn and neglected-loking craft I have ever seen in the merchant service. Occasionally a whiff of smoke would drift from her funnel, showing that she was under way, anyhow, and bound to get somewhere.

"If her appearance and progress were worthy of comment, her behaviour as she rode before the swell was even more remarkable. As her bow would bury itself in a plunge, the water completely

washing over the fo'castle head, the stern would lift, and the faint plug, plug of her propeller blades told us—with the flying spray astern—that she was racing. Then the bow would lift till about 30 ft. of her keel plate was showing, and the water on the fo'castle head would wash back along the iron deck and plunge into the sea. She was certainly a wonder.

"Suddenly an oilskin-enwrapped figure was seen to scramble aft along the heaving deck, and a minute later a grimy red ensign was fluttering at her stern. Simultaneously a string of flags was run up to the tramp's signal halliard. We were 'speaking each other in passing.' Our emigrants, who had been up to this moment keeping up a perfect babel of comment, cheered encouragingly to the crew of the animated derelict, offering their heart-felt sympathy, no doubt. Said crew had mustered about seven strong abaft the deck house, and returned the cheer enthusiastically. We waited developments, each man asking his neighbor what was expected of us, and what we were signaling from our bridge. But nothing happened.

"We lumbered past the little old tramp in grand style, no doubt being gazed upon with reverence as 'the right sort of ship to put to sea in,' the salutations between the resurrected emigrants and the crew of the tramp being kept up till she had—still kicking her heels up in the air—passed beyond hailing distance. I thought of those davits in conjunction with a little overtime to be put in by the engineers.

"Before she passed out of our sight, however, the third mate and a quartermaster came from aft, where they had been adipping colors to the tramp. As I was curious to know whether she had been signaling ice, weather or derelict, I hailed the mate.

"'What did Beauty want?' I asked.

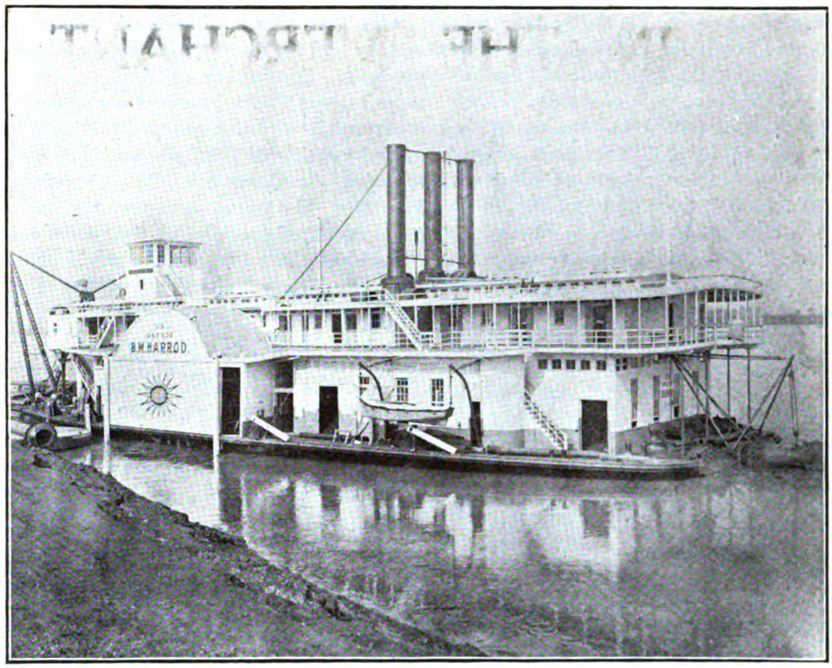
"'Can you guess,' he laughed back as he hurried past, 'why, they wished us a 'Happy New Year.'

"For it was indeed the gladsome first day of a new year, and the North Atlantic is at times a lonely, lonely stretch of water."

THE "STAND-BY" MAN.

DREDGE B. M. HARROD.

The Springfield Boiler & Mfg. Co., Springfield, Ill., has just completed the construction of a large dredge for the United States government. The dredge has been named the B. M. Harrod and is being operated by the Mississippi river commission in the neighborhood of Memphis. The boat is 220 ft. over all, 44 ft. beam with 16 ft. guards. She is a side-wheel steamer with compound condensing engines operating on the wheels by means of a large gear and pinion. The dredge is equipped with a centrifugal dredging pump with 36-in. diameter discharge. To this pump are attached a pair of high-speed, tandem-compound engines generating 1,500 H. P.



DREDGE B. M. HARROD.

A VISIBLE PASSING SIGNAL.

Occasionally there appears a device which, at the very first glance, establishes the fact that as to its value and positive merit no argument is possible; its position is assured and there only remains the old commonplace "why not sooner?"

There is probably no watch officer who has not time and again wished there were some more perfect method of transmitting or at least of confirming passing signals at night. It is an every-day experience that the wind or other causes prevent the hearing of answering signals. By day this doubt or deficiency is minimized by the visual signal of the steam from the whistle of the answering vessel and every officer will recall numerous instances when he has seen his signal answered without having heard it. The occasions when both vessels have blown at the same instant are also common, but by day this is of relatively small importance since each understands the other's signal from having seen the steam blast, but at night this is not possible and the watch officer of neither vessel has any knowledge that the other has given or answered a signal.

There are also the numerous and really difficult cases of a steamer meeting or approaching two others headed on the opposite or on crossing courses when there is no way of distinguishing which is the signaling or answering vessel. All these situations are common enough and are becoming more so each year, and the wonder is, not that collisions and strandings occur as a consequence, but that there are so few. The navigating of the Soo river and the Limekilns (especially the latter) at night with the latter-day ships, drawing all the water available, and meeting and passing within a few feet in a narrow, crooked channel, amid a maze of float and dredge lights and in a strong current, is a feat that requires steady nerves and a cool head without being complicated by difficulties in exchanging signals.

The Atlee flash light solves these difficulties by eliminating them. It is a simple, substantial, well-made device, consisting of a number of incandescent lamps in a lens tube, mounted upon the foremast or any convenient location, visible through the same angles as the standard head and side lights and connected to a sliding contact switch in the whistle pull. A cut-out switch in or on the pilothouse allows of throwing in or out of circuit when desired. Thus, when in circuit, as after sunset, a clear white flash is shown for each pull of the whistle and of the same duration. It is not necessary that the pull shall be moved through any fixed distance, if the wire is overhauled 1 in. the effect is the same as for full throw, the light shows as plainly in one case as the other and whether the whistle is heard or not, the light gives indication of the pilot's intention and understanding. It calls for no

change whatever in the method of wiring pulls, and if the entire electric equipment should be disabled it would not affect the operation of the whistle.

A recent instance where the visual signal would in all probability have averted a collision is the case of the Maryland and Tuscarora. It is said that the Maryland while approaching the Tuscarora mistook the New York, lying at the Grand Trunk freight sheds with her lights showing, for another steamer bound up, and the consequent mix-up in signals resulted in the collision. The light would have disclosed at once the ship making signal.

The Atlee flash light is made in varying sizes, with from four to eight lamps, suitable for ships of different tonnages, has been approved by United States board of supervising inspectors, and can be fitted on any ship having an electric plant. The light can be seen in operation at the office of Babcock & Penton, Perry-Payne building, Cleveland, who will also supply any information desired.

LAKE LAUNCHINGS.

The bulk freighter Caldera, building for the Croxton Steamship Co. of Bay City, was launched from the Bay City yard of the American Ship Building Co. on Saturday last and was christened by Mrs. S. P. Cranage, wife of the manager of the steamship company. The Caldera is 524 ft. over all, 504 ft. keel, 54 ft. beam and 30 ft. deep. She has 30 hatches spaced 12 ft. centers. Her engines are triple-expansion with cylinders 22½, 36 and 60-in. diameters by 42-in. stroke, supplied with steam from Scotch boilers, 13 ft. 9 in. diameter by 11 ft. 6 in. long, equipped with Ellis & Eaves draft and allowed a working pressure of 180 lbs. She will carry 9,000 gross tons. The Caldera will be sailed by Capt. John McNeill. Her chief engineer will be W. Merriter.

The Bennington, the first of the two package freighters building for the Rutland Transit Co., was launched from the Ecorse yard of the Great Lakes Engineering Works on Saturday last. She is intended for trade between Ogdensburg and Lake Michigan ports and is consequently of Canadian canal size. The steamer is 256 ft. over all, 242 ft. keel, 43 ft. beam and 26 ft. 6 in. deep. She will carry 3,500 gross tons.

PITTSBURGH STEAMSHIP CO.'S CAPTAINS.

The annual meeting of the officials and captains of the Pittsburgh Steamship Co. is being held at the Hollenden, at Cleveland, this week. The meeting opened on Wednesday and was addressed by Harry Coulby, president and general manager, and by A. F. Harvey, assistant general manager. Committees appointed to consider various aids to navigation and their recommendations will be submitted at the annual meeting of the Lake Carriers' Association in January. On Thursday, President Coulby announced the appointment of masters for the 76 steamers of the fleet. It will be noted that there are very few changes, as follows:

STEAMER.	CAPTAIN.
Morgan	A. P. Chambers.
Ream	A. C. Chapman.
Rogers	James Leisk.
Widener	Fred Hoffman.
Corey	F. A. Bailey.
Frick	Neil Campbell.
Gary	Richard Tollie.
Perkins	W. H. Moody.
Edenborn	C. Geggenheimer.
Ellwood	C. H. Cummings.
Gates	L. A. Walsh.
Hill	A. J. Talbot.
Poe	W. C. Iler.
Morse	F. O. Whitney.
Houghton	John F. Parke.
Cornell	W. H. Kilby.
Harvard	A. R. Robinson.
Princeton	John Burns.
Rensselaer	S. C. Allen.
Malietoa	R. F. Humble.
Bunsen	John Gemmell.
Van Hise	Fred Watson.
Murphy	George Bowen.
Shaw	H. Culp.
Mataafa	H. J. Regan.
Mauna Loa	L. La Framboise.
Superior City	F. I. Crowley.
Black	Andrew Hauser.
McDougall	John Nahrstedt.
Fairbairn	C. J. Grant.
Fulton	C. G. Ennis.
Bessemer	W. S. Hoag.
Siemens	M. K. Chamberlain.
Coralia	W. H. Campau.
Stephenson	H. G. Harbottle.
Watt	W. J. Hunt.
Crescent City	Frank Rice.
Cole	I. W. Morgan.
Lynch	E. M. Smith.
Baker	George Bell.
Phipps	W. B. MacGregor.
Empire City	James Burr.
Maricopa	C. A. Weitzman.
Ericsson	John Noble.
Linn	George Banker.
Queen City	A. C. Smith.
Zenith City	H. Gegoux.
Eads	A. Montague.
Rockefeller	A. G. McLeod.
Maritana	W. P. McElroy.
Mariposa	C. D. Secord.
Gilbert	A. W. Burrows.
Cort	John Ferguson.
Neilson	T. J. Cullen.
Briton	George Holdridge.
German	I. C. Bell.
Roman	George Randolph.
Saxon	George Ames.
Corona	George McCallum.
Corsica	W. E. Stover.
Manola	S. E. Meeker.
Mariska	A. R. Thompson.
Maruba	C. S. Boyce.
Matoa	Thomas Wilson.
Marina	A. E. Bartel.
Masaba	E. L. Sawyer.
Palmer	Dan McGillvray.
Wolvin	George Reece.
Colgate	John McGarry.
Mather	George Burt.
Trevor	H. Walker.
Cambria	F. W. Light.
Griffin	W. F. Hormig.
Joliet	M. J. Storey.
La Salle	W. E. Warner.
Wawatam	H. T. Kelley.

ANOTHER REMARKABLE FAMILY.

As a sequel to the reference in our last issue to the Dupuie family, a correspondent sends us the following:

William Purvis, a native of Arbroath, Scotland, after following the sea for many years, beginning as a mere lad, came to the lakes, married and settled in the town of Kincardine, Ont., and when the lighthouse on Great Duck island, Lake Huron, was built he was appointed its first keeper, which position he filled until superannuated, after 21 years of service. He is the father of five sons and five daughters, all living. Every one of the boys took to the water, and, with one exception, became masters, and later, owner, and is today sailing his own boat, and in some cases owning others besides. The exception is the youngest of the family, Edward, who is chief engineer of the steamship Jas. S. Dunham. Every boy is 6 ft. or over, is a sailor through and through in the very best sense of the term, and not one has ever used liquor or tobacco. Considering the comparative isolation in which this family was reared and the difficulties of education, the record is phenomenal.

RECORD OF THE ROGERS.

The record made by the freighter H. H. Rogers of the Pittsburg Steamship Co.'s fleet during 1907 was phenomenal. She traveled 44,000 miles and carried 323,567 gross tons of ore. She delivered 29 cargoes, the average cargo being 11,157 gross tons. Her largest cargo was 13,333 tons, which she took from Escanaba to South Chicago. This is a better record than that made by the steamer Wm. E. Corey in 1906, though the Rogers made one trip less than the Corey. The Corey carried 302,547 gross tons, or 21,020 tons less than the Rogers' record. Though the Rogers made one trip less than the Corey she carried enough more ore to make two cargoes for the latter steamer. The average cargo of the Corey in 1906 was 10,085 gross tons.

The largest carrier on the lakes in 1890 was the Manola of the old Minnesota fleet. During that year she made 30 trips and carried 66,000 tons of ore. The capacity of the Rogers therefore is nearly five times as great as that of the largest carrier in 1890. The Rogers is 600 ft. over all, 520 ft. keel, 58 ft. beam and 32 ft. deep.

Capt. Benjamin Cameron, who has been the keeper of the Kenosha life saving station for more than 28 years, has sent in his resignation. His reputation as a life saver began nearly 60 years ago. He saved two lives in 1844 in Chicago harbor. When the Kenosha life saving station was opened in 1879 Captain Cameron was appointed keeper. He received a medal for bravery from Lyman J. Gage, then secretary of the treasury, for his work.

LAKE SHIP YARD METHODS OF STEEL SHIP CONSTRUCTION.

BY ROBERT CURR.

ENGINE.—Fig. 19 illustrates one of the various types of engines built by the Toledo Ship Building Co.

This one is of the 4-cylinder, quadruple-expansion type, built for use with steam pressures of over 200 lbs.

The cylinder diameters are: High pressure, 20 in.; first intermediate, 29 in.; second intermediate, 42 in.; low pressure, 61 in.; with a stroke of 42 in.

The cylinder arrangement is, reading from forward, high pressure, low pressure, second intermediate and first intermediate.

The bed plate and frames are of cast iron box section, a type of bed plate and framing in very general use on the great lakes.

The center of the bed plate is dropped down between the side girders and the center of shaft is kept low down, thus materially lowering the total height of engine above engine room floor.

This type of bed plate also permits the use of a very simple and cheap foundation built up from the tank top with plates and angles.

The valve motion is of the familiar Stephenson overhung double-box link type, the high pressure and first intermediate valves being driven direct, and the second intermediate and low pressure being driven by means of rock arms, this latter contingency arising by reason of the valve chests being placed on the side of the engine in order to shorten it in a fore and aft direction.

These side valve chests are a great advantage over valve chests placed in the line of the cylinders as is done with many European marine engines, since the valves are thereby rendered very easy of access for adjustment and repair, a point of considerable importance.

The high pressure and first intermediate valves are of the piston type in order to reduce friction and wear due to the high pressure and temperature in which these valves work.

Direct acting steam reversing gear is fitted, this being the only kind with which lake engineers have any patience with nowadays.

A lake engineer would fairly sweat with impatience if given a gear of the "all-around" type, so familiar on many salt water vessels.

The crossheads and crank shaft are of cast steel.

The crank shaft is of the built up type, the crank shaft being bored and shrunk or pressed on to the section of shafting and keyed.

The connecting rods are of the usual type with solid top ends lined with brass boxes adjusted by means of a side entering wedge.

The bottom ends have babbit lined cast steel boxes bolted to the rod.

The main journal boxes are lined with babbit, and the bottom half is arranged to be readily shimmed up in case of wear.

The air pump and condenser are of the jet type, attached to the bed plate and one back column of the engine, the air pump being driven by a double plate beam connected to the high pressure crosshead.

The condenser is fitted with the latest type of internal injection valve which secures perfect control over the volume of injection water and at the same time maintains the form of spray always the same, thereby enabling the engineer to work with whatever vacuum he chooses all the time.

The handling levers are located at the top of the front frames in a convenient place for handling from a platform or working deck.

Passover valves and piping are provided to allow the use of boiler pressure steam in the first intermediate, second intermediate and low pressure cylinders, should occasion demand.

Indicator piping is also fitted for marine engineers are quite conversant with the use of the indicator, many of them possessing an instrument of their own, and all of them taking keen interest in the economical operation of their engines as revealed by indicator cards.

The engine, as a whole, is of neat, simple and substantial design, all parts being readily gotten at for adjustment and repair, all wearing parts arranged so that wear can be taken up, and every improvement that recent lake practice approves being embodied.

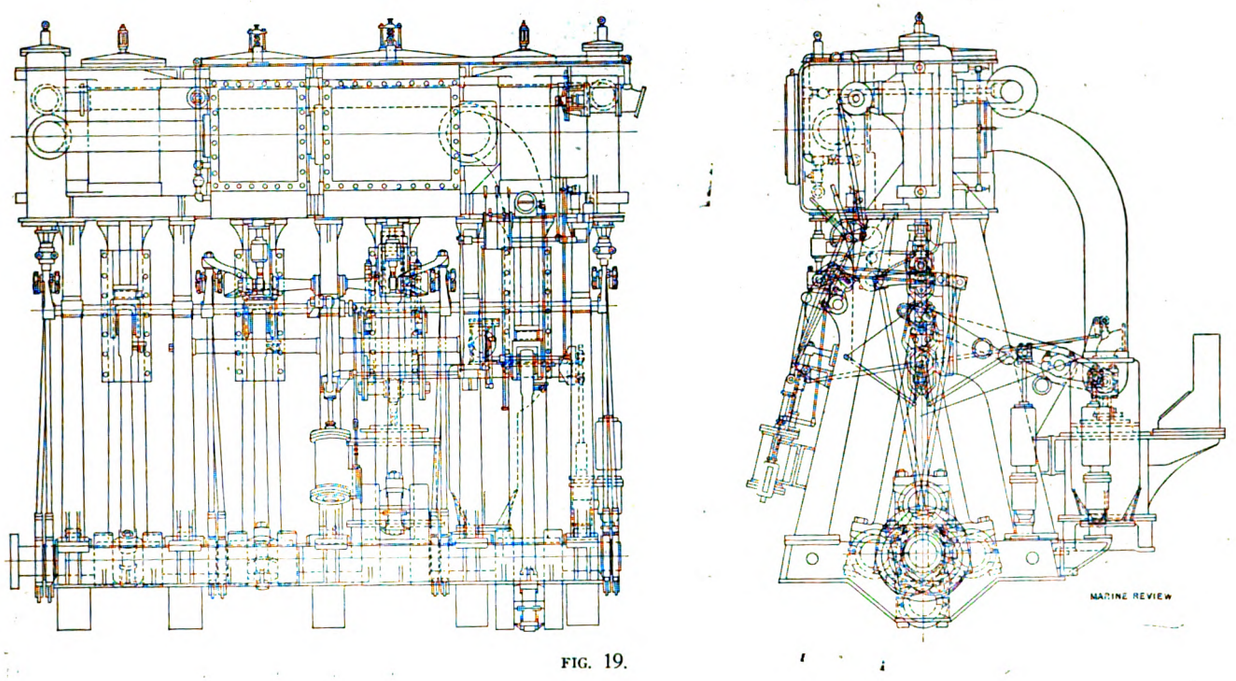


FIG. 19.

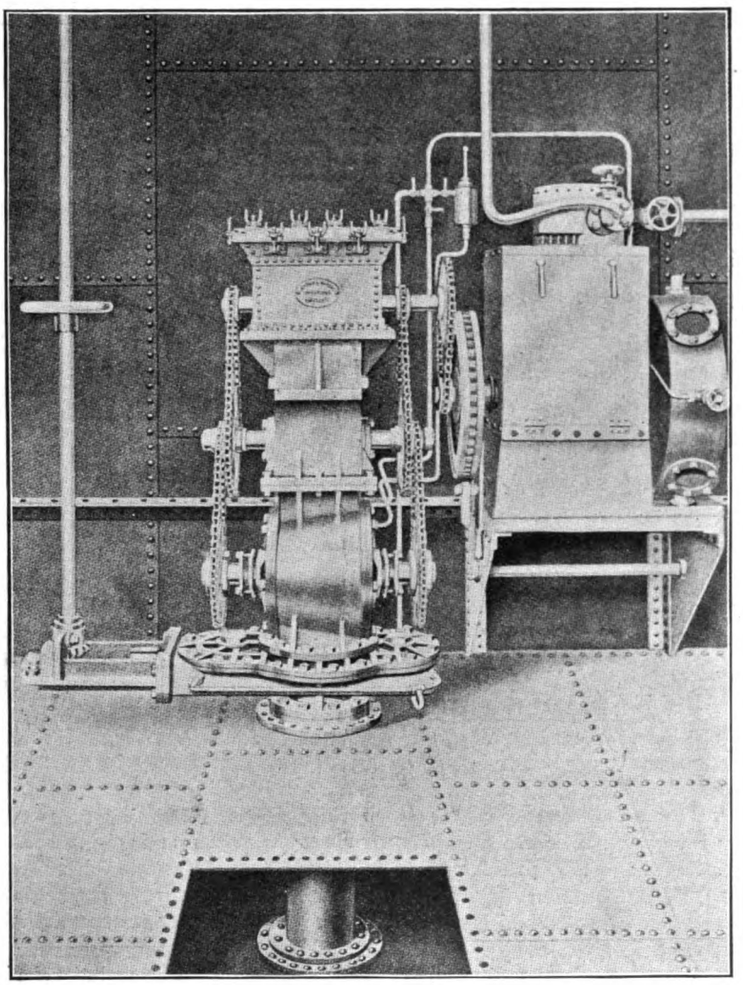
John J. Boland & Co. announce that after Jan. 1 their firm will be known as Boland & Cornelius, who will conduct a general transportation business.

STONE'S UNDERLINE ASH EXPELLER.

The accompanying illustrations are two views of Stone's patent underline pneumatic ash and clinker expeller, one view showing an elevation of the machine itself, the other a sectional view of a ship with the expeller in action.

This ash expeller has been especially designed to meet the requirements of every-day ship use, and embodies in its construction many advantages over the ordinary type of ash expeller discharging from the side of the vessel. In addition may be mentioned its ability to crush and dispose of such matter as clinker, fire brick, or other foreign substances. Engineers will appreciate the superiority of a type of ash expeller that dispenses with the necessity of studying weather conditions on deck, working ashes up on the leeward side of the vessel, or holding the ashes below till better weather prevails.

All parts of the expeller, which is driven by air motor, are at all times accessible for examination, whether at sea or in dock, the whole apparatus being self-contained, and only requiring a couple of pipes to be connected to it. It is absolutely silent in its working, causing none of the annoyances experienced where ash discharge pipes are carried through partitions and decks in the vicinity of cabins. The fact that the pipes do not lead through what is ofttimes inaccessible parts of the coal bunkers is another advantage.



FRONT ELEVATION OF STONE'S ASH EXPELLER AS FIXED IN STOKEHOLD.

As the ashes are projected with sufficient velocity to carry them deep enough to clear all suctions, no trouble is experienced from that source. Past experience has also proved that there is absolutely no scoring action of ashes on the hull of the ship, or possibility of their coming in contact with the stern tube.

The Stone's patent underline pneumatic ash and clinker expeller is constructed at the Exeter Machine Works, Pittston, Pa., the representative being W. Carlile Wallace, 26 Cortlandt street, New York.

LIFE-SAVING CABLEWAY FOR SHIP USE.

There is now in course of construction at the yard of the Pusey & Jones Co., Wilmington, Del., a vessel for the revenue cutter service which will be unique in having as part of its equipment the first life-saving cableway for ship use. The boat is being built in response to urgent requests for better life-saving facilities on some parts of the Pacific coast, and will be stationed at Neah Bay, within five miles of Cape Flattery. She will be 152 ft. in length, and is to cost $189,057.

The life-saving cableway, in the words of the inventor, Spencer Miller, of the Lidgerwood company, is the regular breeches buoy apparatus used along our coasts, plus an automatic reel. Without the automatic reel the breeches buoy would be impracticable between a moving ship and a wreck; with the automatic reel the apparatus becomes practicable. The function of the automatic reel, therefore, is to maintain a uniform tension in the elevated line or hawser, but permitting its length to vary as the motion of the ship or ships demand. It must pay out the rope without jerks under tension as the ships separate, and wind it in rapidly as they approach. Furthermore, it must permit the breeches buoy to be workable at 300 ft. from wreck to tug, should the water be deep enough, or 1,000 ft. should such be necessary. This automatic reel will have a maximum in-pulling power of 2,000 lbs., which may be reduced at will, and will wind in the hawser at the rate of 1,000 ft. per minute, which is believed to be far in excess of the requirements.

The means for landing the passenger safely on deck is the same hauling-down device which has been so successfully employed in the marine cableway for coaling at sea, also the invention of Mr. Miller. Tackle is secured to a pulley which runs upon the hawser or upper cable some 30 or 40 ft. abaft the main mast, and, on the approach of the passenger, by this means the main hawser will be hauled to the center of the quarter deck of the cutter, inwardly as well as downwardly.

At the general meeting of the Society of Naval Architects and Marine Engineers, in November, Mr. Miller referred to the report of the life-saving service for last year which showed that 189 passengers were brought ashore in the breeches buoy alone. Considering the limitations of the breeches buoy, this is a remarkably good showing, and, considering that

there is no record of a passenger losing his life in the buoy, speaks well for the useful and reliable qualities of the apparatus. The fact that there has been no difference in the operation of the marine cableway, in every sea trial, whether the sea be rough or smooth, showed the practicability of applying the device in operating the breeches buoy under any weather conditions, and prompted Spencer Miller to offer his device for use in the revenue cutter service.

SPEED INDICATOR AND SHIP LOG.

An interesting exhibit at the New York Engine and Motor Boat Show was the ship log and speed indicator of the Nicholson Ship Log Co. of Cleveland. The speed indicator, which is specially designed for motor boats, steam yachts and other pleasure craft, can be placed in the cockpit or cabin in full view of the navigator. The sea connection is a ⅜-in. brass pipe, projecting through a ¾-in. sea cock, about ½-in. through the shell of the boat. This pipe has a plug in the bottom. A hole in the pipe facing forward forces the water into a float pipe, the float therein operating the instrument. A level float or equalizer keeps the instrument in adjustment when there is a change in the load line, and prevents vibration when the boat is pitching.

The Nicholson Ship Log No. 2 is designed on the same principle as the speed indicator but is a much more elaborate instrument. It is used principally on passenger and freight steamers, and has a recording chart which shows the average speed made at any time on the run in addition to the indicator showing knots per hour. This log is entirely automatic, and requires very little attention. Being able to know at all times the exact speed of the vessel by simply glancing at the speed dial and having the speed with time and date on a record chart, is of the utmost value in the navigating of a vessel. Provision has been made to prevent any chance of the permanent choking of the projecting pipe with weeds or mud, and the pipe can at any time be withdrawn if necessary.

United Harbor No. 1, American Association of Masters, Mates and Pilots, have issued invitations for their annual entertainment and reception in the Grand Central Palace, Forty-third street and Lexington, New York, on the evening of Wednesday, Jan. 8.

BIDS FOR NAVAL SUPPLIES.

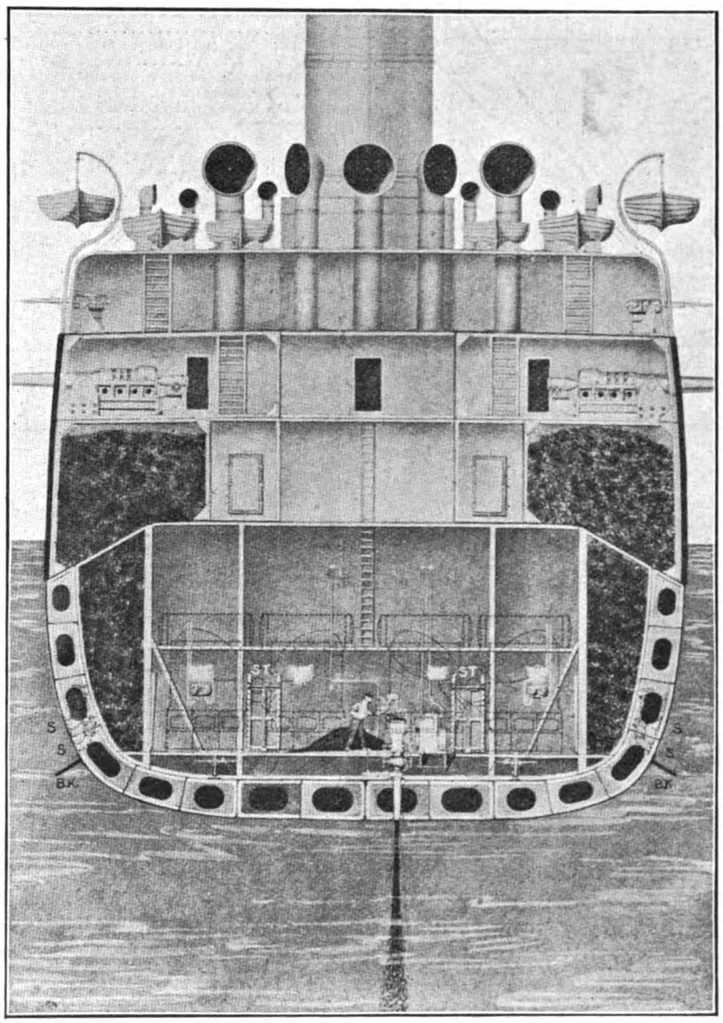
The following communication from the paymaster general of the navy, being descriptive of the department's policy regarding bids received from manufacturers and jobbers, is of general interest to firms wishing to furnish supplies for the navy, and is therefore reproduced complete.

"Navy Department,
"Bureau of Supplies and Accounts,
"Washington, D. C., Dec. 14, 1907.

"Sir: The bureau recently forwarded to certain manufacturers, 160 in all, a circular letter explaining the recent improvements in the contract business of the navy department as regards: (a) waiving of bonds and contracts on proposals less than $500 in value; (b) unloading, at government expense, deliveries at navy yards; (c) obviating delays in payment for deliveries made, and (d) abolishing 10 per cent reservation from value of deliveries, etc., with a view of encouraging competition, thus eliminating certain objectionable features of bidding.

"This letter has been given widespread attention through certain mediums—trade journals, jobbers' associations, etc., and the impression has been created and disseminated broadcast throughout the country that the bureau intends to confine competition to manufacturers only, by refusing to consider bids from the wholesaler, jobber, retailer and middleman.

"The bureau has neither the desire nor the power to exclude any reputable dealer from bidding on naval supplies. All bids from such persons will be given the same consideration, and in each case award will be made to the lowest formal responsible bidder. By reason of the form of contract many responsible firms were unwilling to deal directly with the bu-



SECTION OF WAR VESSEL SHOWING MODE OF FITTING STONE'S ASH EXPELLER.

It will be seen by above illustration that the point of discharging ashes and clinkers is considerably below the sea suctions (s. s.) and stern tubes (s. t.), which are further shielded by the bilge keels (b. k.).

reau. By removing these onerous conditions it is hoped that such firms will bid directly for the navy business, and, by thus widening competition, give to the navy better prices and prompter deliveries.

"Respectfully,

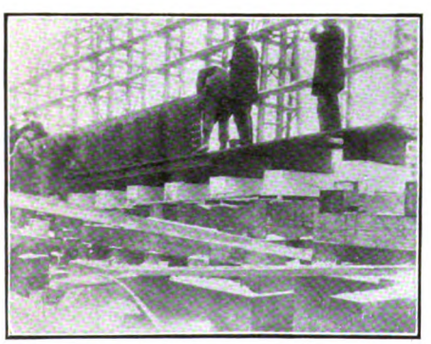
(Signed) "E. B. ROGERS,

"Paymaster General, U. S. Navy."

KEEL OF THE NORTH DAKOTA LAID.

The keel of the North Dakota, the first of the great American Dreadnoughts, was officially laid at the yards of the Fore River Ship Building Co., at 10:10 a. m., Dec. 10, 1907, at the exact moment that the battleship fleet received its order to sail from Hampton Roads for the Pacific. The first vertical plate was erected at 10:30 and the first frame at 11:20. The laying of the keel represents the beginning of the actual assembling of the various parts of the ship into ship form. The keel and what is known as the laying of the keel, consists of putting into place on the keel blocks the first plate of the bottom part, or what might be called the backbone of the ship. It does not indicate, however, that the building of the ship has only begun, for before the keel is laid it is necessary to have on hand large quantities of material, much of which has already been laid off, punched and in other ways prepared for putting into place. It also means that the ship has been completely laid down in the mold loft and that probably 50 per cent of all the plans in the construction of the ship are developed and approved. This is, perhaps, better indicated by the fact that the official reports of completion of the North Dakota on Dec. 1 showed that the vessel was at that time 7.84 per cent completed.

THE KEEL PLATE AS IT IS LIFTED BY THE CRANE.



THE FIRST VERTICAL KEEL PLATE IN PLACE ON THE TWO OUTER KEEL PLATES.

Following are the leading particulars of the North Dakota:

Length on load waterline (about)	510 ft.
Breadth, extreme, at load waterline (about)	85 ft. 2⅝ in
Displacement on trial, not more than	20,000 tons
Mean draught to bottom of keel at trial displacement	27 ft.
Total coal bunker capacity (about)	2,300 tons
Coal carried on trial	1,000 tons
Feed water carried on trial	66 tons
Speed on trial	21 knots

ARMAMENT.

Main Battery.

Ten 12-in. breech-loading rifles.

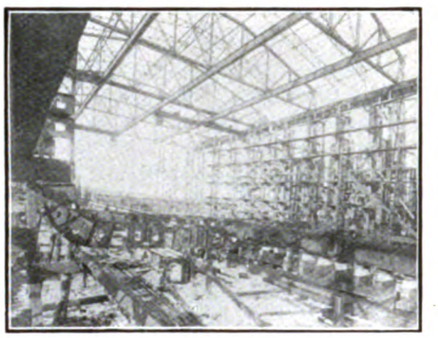
Secondary Battery.

Fourteen 5-in. rapid-fire guns.
Four 3-pounder saluting guns.
Four 1-pounder semi-automatic guns.
Two 3-in. field pieces.
Two machine guns, caliber .30.
Two submerged torpedo tubes.

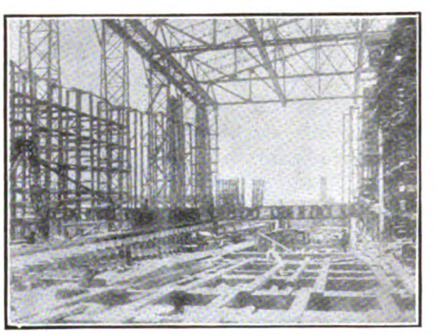
INSPECTORS—FROM LEFT TO RIGHT: COM'DR, JOHN L. GOW; LIEUT., C. L. ARNOLD; NAVAL CONSTRUCTOR, H. G. GILLMOR; LIEUT. COM'DR, ROGER WELLES.

INJURIES TO THE REIS.

The accompanying photographs show clearly the extensive nature of the injuries to the steamer Wm. E. Reis which was in collision with the Monroe C. Smith near Algonac on Nov. 1. The hole on the port side of the steamer extends from the hatch clear down to the bilge, the vessel being practically broken in two. In fact, it will be necessary to cut the hull in two in the dock in order to rebuild the portion which is so thoroughly destroyed. The Great Lakes Engineering Works has a small army of men at work upon it and they will be continuously engaged until the opening of navigation to restore the steamer to her former condition. This is the heaviest repair job of the winter. The photographs showing the twisted and broken beams and stanchions speak very clearly of the terrific force of the impact. It is physically impossible to take photographs of the bottom of steamers, but if it were possible the bottom of the Reis would present quite an amazing sight. As it is, the condition of the tank top gives an illuminating index. The bottom of the ship is pushed upward about 4 ft. for a distance of 75 ft., beginning forward of amidships. The tank top is similarly forced out of position. Near the boilers the bottom is again pushed upward 4 in. for a distance of several feet. Two of the bulkheads of the vessel will have to be taken out and replaced and nine of the deck beams are buckled and several are broken. About 85 hull plates and 40 tank top plates will have to be removed. Moreover the interior of the after cabins will have to be stripped of every part of the woodwork as the water has twisted the paneling all out of position. The accompanying photographs show the boat in the floating dry dock at Ecorse.



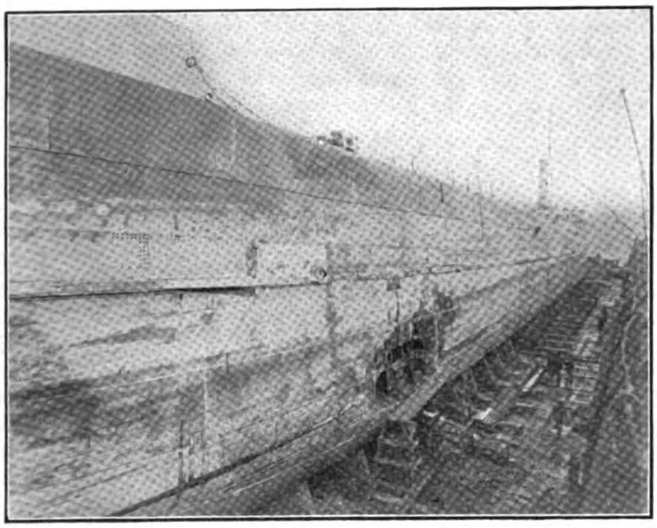
ON THE SECOND DAY.

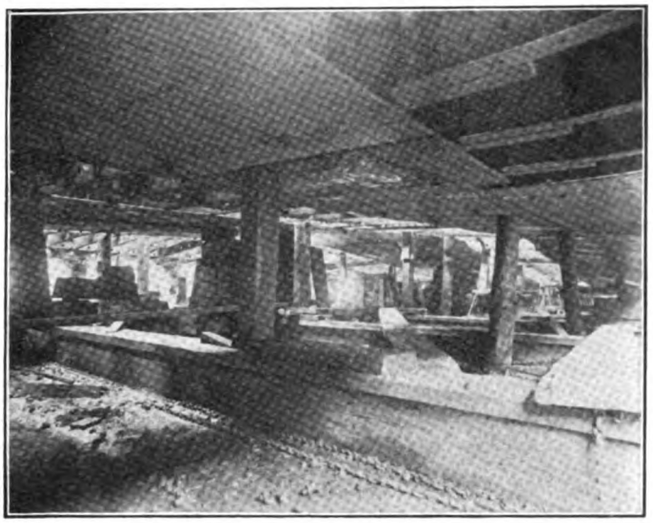


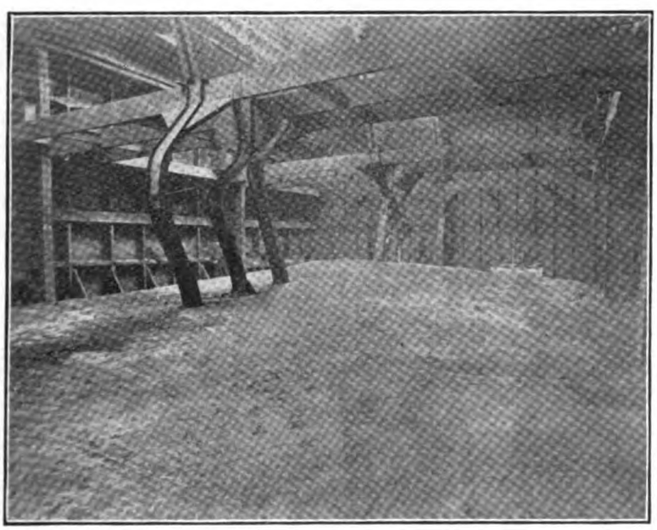
THE FIRST FRAME ERECTED.

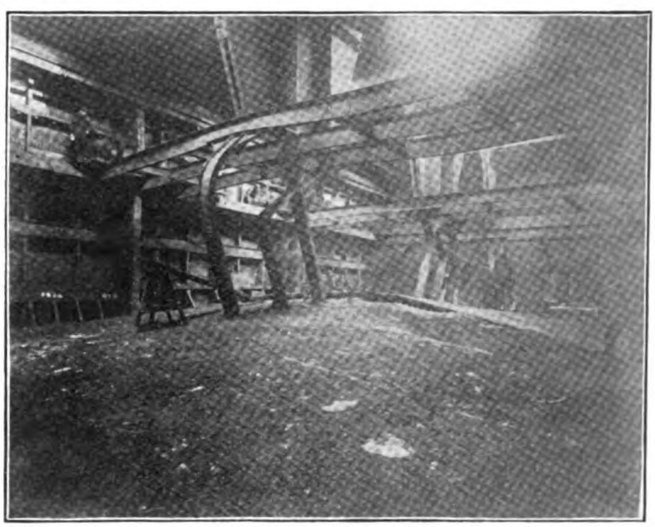
The government grain elevator at Port Colborne will be ready to receive cargo shortly after the opening of navigation. Its capacity will be about 2,000,000 bushels and it will be fitted with the most modern machinery for the rapid handling of grain. The elevator was designed by J. S. Jamieson, of Montreal.

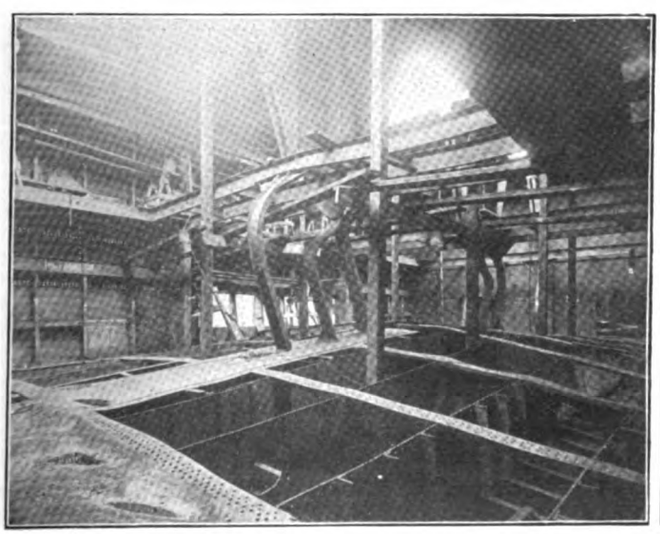
Some Graphic Photographs Showing the Twisted Beams and Columns and Broken Tank Top of the Steamer William E. Reis, Now in the Floating Dry Dock of the Great Lakes Engineering Works at Ecorse.

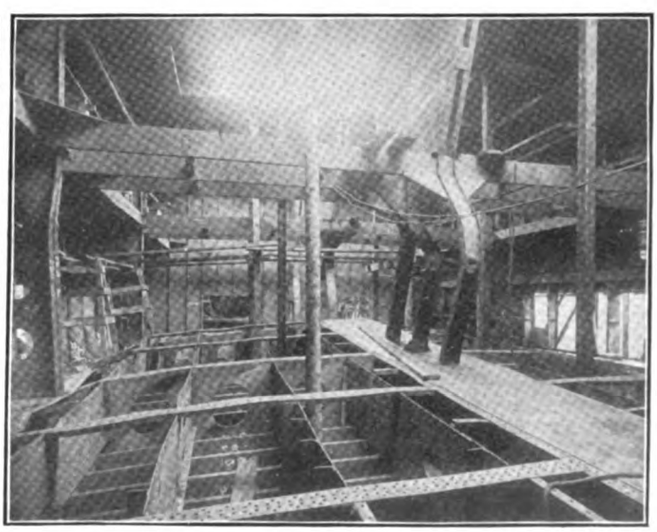






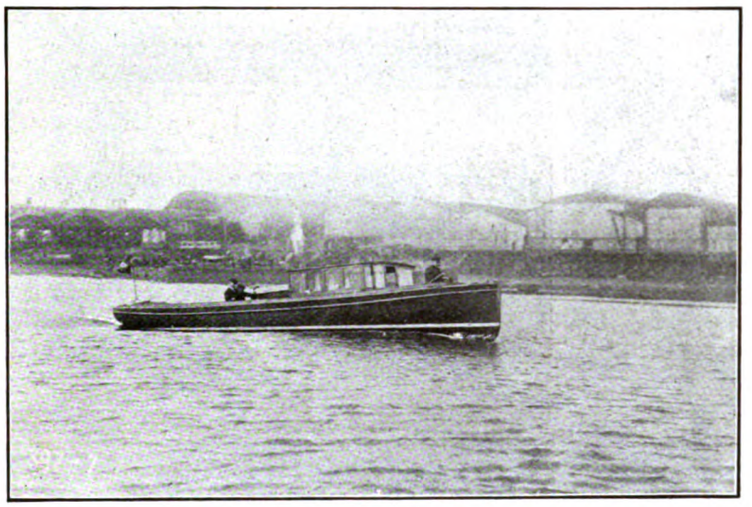






A THORNYCROFT MOTOR LAUNCH IN CENTRAL SOUTH AMERICA.

In July of last year Messrs. Thornycroft & Co., of Chiswick, London, W., shipped a motor launch to Central South America for passenger service on a lake near Asuncion to ply between the towns of San Bernandino and Aregua (six miles apart). This boat, the Violeta (which is shown in the photograph running speed trials on the Thames) is 40-ft. long, by 9-ft. beam, by 3-ft. draught when loaded with 30 passengers and 1½-tons of cargo. The hull is carvel built of mahogany, and the machinery consists of a Thornycroft 4-cylinder 6-in. by 8-in. motor, developing 50 B. H. P. at about 800 R. P. M. on paraffin, coupled to a Thornycroft reversing gear driving a solid propeller. The speed on trials at home proved to be 12 miles an hour.



A THORNYCROFT MOTOR LAUNCH IN CENTRAL SOUTH AMERICA.

Messrs. Thornycroft have now received a letter from their customer advising delivery of this boat, which letter is given below verbatim:

San Bernandino, 17th October, 1907.

"Gentlemen,

"The Lamport & Holt's S. S. Dettingen with the Violeta arrived in Buenos Ayres on the 27th August, then was transhipped to Asuncion, where she arrived 18th September. Two days after, she was in the lake here; she neither had a scratch on her, nor a pane of glass broken; great credit is due to the way she was packed; I only took her out of her crate when she was floating in the water; 7,250 miles without the slightest damage is, I should think, a record.

"The first real trial I made with her was with naphtha; she ran 24 miles (40 kilometres) in 1 hour 52 minutes, and without a stop—making 522 R. P. M.; I hope to get 800 revolutions out of her, with a corresponding increase of speed.

"The day I tried her there was a strong south wind; there were thirty people on board—we were drenched with spray, but she shipped no water; she will, I am sure, give complete satisfaction.

"When in Buenos Ayres I visited several marine motor launches, and saw not one that could touch the 'Violeta' in power or speed. You are welcome to use this letter in any way you may please. I am, etc.,

(Signed) H. E. STANLEY."

A THORNYCROFT LAUNCH FOR RUSSIA.

Marine motoring has found a good footing in Russia, and no small number of these craft are to be seen on these waters which have come from the yard of Messrs. Thornycroft & Co., of Chiswick, England. One of the most recent of these, is a boat for St. Petersburg, which has been purchased by the well-known Franco-Russe works. She is carvel built of mahogany, 30 ft. long, with a beam of 6 ft., and 22 in. draught. A mahogany cabin is fitted amidships, having plate glass windows with curtains, whilst forward of this, partitioned off by a bulkhead, is a well-equipped lavatory. The forward cockpit, wherein is installed the motor, is covered by a brown canvas spray hood. The motor installation consists of a four-cylinder 24 B. H. P. Thornycroft motor, working on petrol or paraffin, as desired, by means of the Thornycroft change-over device. Steering is by wheel or tiller, and a Thornycroft reverse gear is fitted. A speed of 11½ miles per hour was attained on trial, without effort, as a mean of runs with and against the tide.

THORNYCROFT LAUNCH FOR RUSSIA.

TWO THORNYCROFT MOTOR LAUNCHES FOR BORNEO.

Two seamless steel motor cargo boats, for use in Borneo, to carry Borneo benzine, which fuel they will use in their motors, have recently been shipped by Messrs. Thornycroft, of Chiswick. These boats are, as the photograph shows, of a very serviceable type, with ample freeboard. They are 30 ft. in length, with 8 ft. beam and a draught of 22 in. The hulls are very commodious, enabling

a great deal of bulky cargo to be carried if desired. Notwithstanding the large beam in proportion to length, the 12 B. H. P. Thornycroft motor enables a speed of 8½ miles per hour to be comfortably attained. The motors, which are the same in both boats, have two cylinders, 4½ in. diameter by 5 in. stroke, and run

THORNYCROFT MOTOR LAUNCH FOR BORNEO.

at 1,000 revolutions. The Borneo spirit is vaporized by means of the now well-known Thornycroft vaporizer. Low tension magneto is used. Steering is by tiller and a Thornycroft reversing gear, with bronze solid propeller, is fitted.

KEYMER WEDGE KEEL BLOCK.

The Keymer wedge keel block is a steel device designed to take the place of the wooden blocks now used under the keel of a ship and which probably have been used since the time of Noah. The Keymer patent keel block (patent applied for) has two pairs of wedges mounted in suitably arranged recesses in the case, and are caused to slide upon

RAISED

each other by means of a right and left hand threaded screw and rotating nuts; said screw being held in a fixed horizontal position by an ingenious ball and socket device, thereby causing both the upper and lower wedges of each pair to travel upon each other and in or out of the case an equal amount.

Each pair of wedges is furnished with a suitable tongue and groove so as to avoid a possible binding action, and the ends of the screw are milled with a square of hexagon heads, so that any standard wrench can be used. Ratchet wrenches, however, can be provided with each set of blocks if desired, so that the blocks can be placed in any close quarters and still be easily operated in either direction.

The bevel of the wedges is made flat

LOWERED

enough so that they stay in any position placed, regardless of the load or strain they are subjected to, should it be necessary to remove the screw for any reason of which we cannot conceive, as all parts are proportioned with a very large factor of safety.

The standard size block is designed to raise a load of 20 tons with the power determined by the following formula for wedges: W;h; P: 1, and for screw W: Pitch; P: N L. Therefore at the end of a 15-in. wrench handle it would require about 283 lbs. of force to raise 20 tons resting on the cover of the block, or in other words the weight of two average size men, by neglecting friction. If 18 per cent be allowed for friction of steel on steel slightly unctuous, we would have to add 3 lbs. to above total power of about 290 lbs. required to raise 20 tons of weight, including that absorbed by friction. Now, if but one man per block were available it would require a 3-ft. wrench handle instead of 15 in. to get the same results.

The advantages claimed for these blocks are that they can be readily removed and replaced in any position with a few minutes time. The average vertical movement of the cover being 2 in. although that points may be regulated by the size of the blocks. Now if all the blocks under a new ship were lowered simultaneously it could be launched from its ways within a half hour from the time operations were begun, and not a single block would have to be reduced to kindling wood, but all be fit to use again as often as necessary.

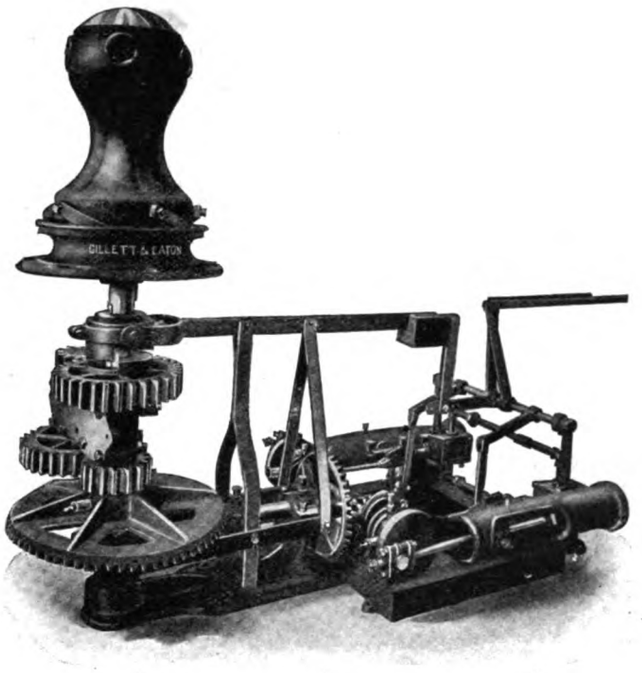
On another occasion one block was placed under a boat in the great lakes yards at Detroit between two blocks 9 ft. on centers, so that this block was from one block and 5 ft. from the other, and the entire end of the ship was raised enough to knock out the blocking 4 ft. away with a blow from a hammer.

These blocks are manufactured by the Keymer Mfg. Co., 2021 West 100th street, Cleveland. P. Keymer is the inventer of the block and P. H. Brandt designer.

NEW SPUR GEARED CAPSTAN.

The accompanying cut represents a new style spur geared capstan, recently put on the market by Gillett & Eaton, of Lake City, Minn. Having had a number of inquiries and realizing the real need of a spur-geared steam capstan, that could be easily changed from single to back geared and vice versa by the simple movement of a lever. The firm in this machine fill a long felt want. All the gearing is of steel, thus overcoming any danger of breakage. The engine is of superior design and construction, and built for high steam pressure and heavy service and is reversible.

One lever operates the gearing; one extremity of same giving the single gear fast motion to the spool and the other extremity giving the back geared, slow and powerful motion and the same direction of rotation. The lever placed in the center notch releases the spool and spindle entirely, permitting same to be turned either

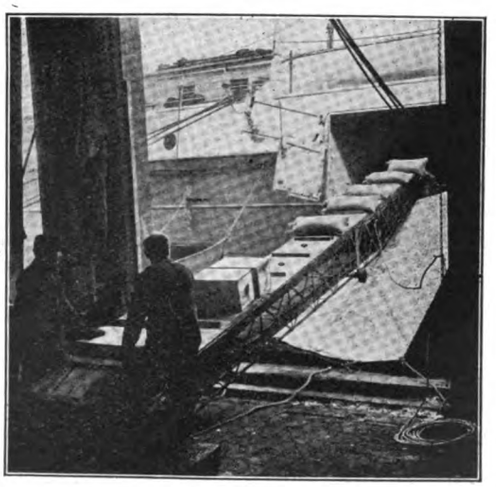


NEW SPUR-GEARED CAPSTAN.

direction with hand bars. The spool has a polished brass cap, with the name of the steamer, owners and date nicely engraved.

SPENCE CONVEYORS.

The accompanying illustration shows two Spence portable electric conveyors, each 50 ft. in length which were bought by the Federal Sugar Refining Co., Yonkers, N. Y., and are



SPENCE PORTABLE ELECTRIC CONVEYORS.

now in operation. These are used for carrying 350-lb. sacks of raw sugar from vessels, across warehouse and up into the hoppers. A great saving of time is effected, besides overcoming the tearing of sacks which often occurred when trucking was done by hand.

LEVEE WORK ON MISSISSIPPI.

Capt. G. M. Hoffman, corps of engineers, Vicksburg, Miss., recently opened bids for levee work in the Mississippi river. The bidders were: Lowrence Bros., Memphis, Tenn.; P. P. Gilchrist, Cuffy, Miss.; George Miller, Duncansby, Miss.; John G. Sessions, Grand Lake, Ark.; R. L. Leonard, Memphis, Tenn.; Roach & Stansell, Memphis, Tenn.; W. M. Bates, 68 West Court street, Memphis, Tenn., and G. A. Gibson, Natchez, Miss. The contract for stations 1,600 to 1,800 at $3,600 was awarded to P. P. Gilchrist, Cuddy, Miss., and George Miller, Duncansby, Miss., received the contract for stations 1,645 to 1,720 at $26,149.20. W. M. Bates, Memphis, Tenn., received the contract for stations 871 to 916 on Arkansas river at $30,160, and stations 3,560 to 3,671 at $31,050. George A. Gibson, Natchez, Miss., received contract for stations 3,460 to 3,560 at $34,200.

REPAIR WORK AT MILWAUKEE.

The plant of the Milwaukee Dry Dock Co. is unusually busy with repair work. For the past two months the car ferry Ann Arbor No. 1 has been in the south dry dock undergoing reconstruction. It will probably take a month more to complete repairs upon her which are of an extensive character. Another big repair job is the steamer George W. Peavey. Her cargo hold is to be reconstructed. It will be made to conform with modern appliances for loading and unloading. Many vessels are waiting in the slips and the yard will be very busy until navigation opens.

AROUND THE GREAT LAKES.

The Detroit & Cleveland Navigation Co. and the Detroit & Buffalo Steamboat Co. have sent out a New Year's greeting bearing a representation of the new steamer City of Cleveland with the flags of happiness, good health and success flying from the foremast.

Col. W. L. Fiske, government engineer, will succeed Col. Henry M. Adams as United States engineer at Buffalo on Jan. 18. Col. Adams will retire in May next. For the past four years Colonel Fiske has been serving in the Philippines. Prior to that he was stationed at Detroit in charge of the Lake Survey.

A civil service examination for assistant lighthouse keepers, officers of lighthouse tenders and light vessels in the eleventh lighthouse district will be held in the office of the lighthouse inspector at Detroit, Mich., on Wednesday, Jan. 8, 1908. Necessary blank applications and other information can be obtained on application to the lighthouse inspector, 405 Postoffice building, Detroit, Mich.

The new coal dock of the Duluth, Missabe & Northern railway at Duluth will be ready for business shortly after the first of the year. The machinery will be tried out on a boat now lying at the dock. The new dock is one of the best and most modern in the country. Its capacity is 650,000 tons and it is a very valuable addition indeed to the coal handling facilities at the head of the lakes.

ELECTRICAL EQUIPMENT OF STEAMER MOMUS.

It is a well-known fact that on board ship, where every inch of space counts, all generating apparatus, whatever its nature, must above all possess the feature of compactness. To no other part of the generating apparatus does this apply with more force than to the generating sets for electric light and power. The space usually reserved for the electrical apparatus is always comparatively small and at times totally inadequate for the proper handling of the apparatus. It is therefore not surprising that marine engineers are always eager to adopt any type of generating set that embodies compactness with the ability to give reliable and satisfactory operating with minimum attention. A noteworthy example of a modern marine generating plant is found on board the steamship Momus, built for the Southern Pacific Co. of New York by William Cramp & Sons of Philadelphia.

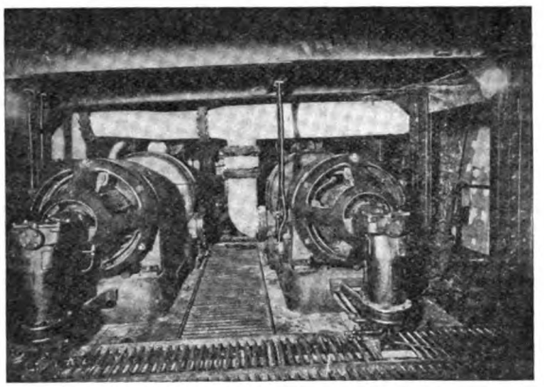


FIG. 1—75-K. W. CURTIS TURBINE GENERATING SETS, INSTALLED IN ENGINE ROOM OF STEAMSHIP MOMUS.

The generating units as shown in Fig. 1 consist of two 75-kilowatt, 110 volt direct-current generators direct connected by means of flexible couplings to Curtis steam turbines of the horizontal type revolving at a speed of 2,400 revolutions per minute. Each turbine is of the two stage condensing type, each stage having two bucket wheels and one set of intermediate or fixed buckets. The turbines and generators are each equipped with two bearings and each set is assembled on a rigid bed plate cast in one piece.

The generators are of the four pole compound wound type and of the latest and most improved General Electric design. On account of the high speed the commutators are of the shrink ring construction, the segments being held firmly in place by steel rings shrunk on the commutator and insulated therefrom by mica bands of suitable thickness. Specially treated carbon brushes eliminate commutator troubles and reduce brush friction to a minimum.

With 250 lbs. steam pressure, 28 in. of vacuum, and 100 degrees Fahr. superheat, the steam consumption at full load is 24.5 lbs. This figure is equivalent to about 16.5 lbs. per brake horsepower under the conditions given. The 24.5 lbs. at full load is expressed in pounds per kilowatt delivered at the generator terminals, assuming the generator efficiency at 90 per cent.

The high speed of operation makes the question of lubrication a very interesting one. All working parts of the valve gear, including the oil reservoir on the hollow governor lever, are oiled by hand. The main bearings are furnished with oil under pressure from an oil pump on the end of the generator shaft. All four pillow blocks are provided with auxiliary oil wells and rings. The bearings are of the self-aligning, ball seated, babbitt-lined type made in halves. Nothwithstanding the high speed, no vibration is noticeable when these sets are running under full load.

A 10-kilowatt generating set, consisting of a General Electric marine type, 110-volt generator direct-connected to a single cylinder engine of the same make, furnishes power for the ordinary day load of the vessel when at sea and also is used when the vessel is discharging cargo at the docks.

In Fig. II is shown a view of the switchboard. It is constructed of white marble and consists of three panels; the outside panel being for the 75-kilowatt sets while the inside panel is for the 10 kilowatt set. The switchboard is equipped with the necessary instruments, and the connections are so arranged that the 75-kilowatt sets may be run in parallel and any circuit may be connected to any set.

A searchlight is a necessity on board a coastwise vessel, and the importance and usefulness of this piece of electrical apparatus is not overestimated. It serves to pick up buoys in channels, to signal between vessels at sea, and is very useful when the vessel is making a dock at night time.

This vessel is equipped with a 24-in. General Electric searchlight with pilot-house control. The light is installed on top of the pilot house and projects a beam of light of sufficient intensity to render plainly discernible on a clear, dark night a light colored object 10 x 20 ft. in size at a distance of not less than 5,000 yards. This type of lamp as shown in Fig. III is of the horizontal carbon type and is designed for both hand and automatic feed.

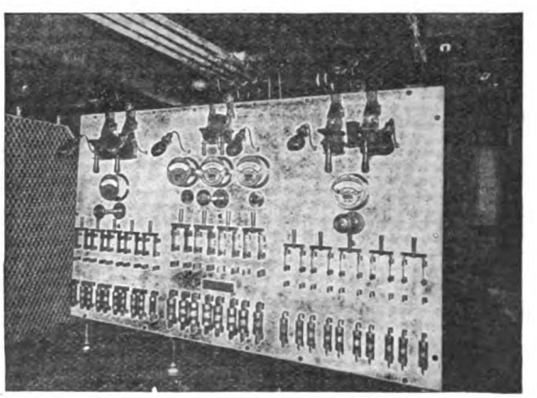


FIG. 2—SWITCHBOARD INSTALLED IN ENGINE ROOM OF STEAMSHIP MOMUS.

Besides furnishing power for light,

the generating sets supply current for the electric heating system, ventilating fans, and numerous small motors driving dish-washing machines,

FIG. 3—24-IN. SEARCHLIGHT INSTALLED ON STEAMSHIP MOMUS.

ice cream freezers, etc. The electric heaters, of which there are 157 in number, were designed especially for this installation by the General Electric Co. The use of electric heaters was a rather bold and unprecedented departure from the regular practice of steam heating, but up to the present time the operation has been entirely satisfactory.

The fact that the electrical equipment of the Momus is duplicated on two other ships owned by the same company, is worthy of mention and further indicates the extent to which this type of equipment is becoming utilized for light and power purposes on board ship.

CHAMPION RIVET CO.

An unusually attractive booklet in the interest of its product has been gotten out by the Champion Rivet Co., Cleveland, the maker of Victor steel rivets. Primarily the booklet contains an extensive, illustrated report on tests made with Victor rivets. Besides are given the specifications of the American Boiler Manufacturers' Association for boiler rivets, the specifications of the Association American Steel Manufacturers for boiler rivet steel, as well as the requirements of Lloyds, the United States navy and the British admiralty.

Three prize papers on "How to Heat and Drive Good Steel Rivets," the prizes for which were tendered by the Champion Rivet Co. and awarded at the regular annual meeting of the International Boiler Makers' Association, held in Cleveland, May, 1907, are reproduced.

In the remaining pages are given halftone reproductions of some of the notable structures and boilers on which Victor steel rivets have been used. Included are the United States armored cruiser Washington, the United States cruiser Des Moines, the Imperial Russian cruiser Variag, the steamship Minnesota of the Great Northern Steamship Co., the schooner Thos. W. Lawson, etc.

The plant of the Champion Rivet Co., covering 4½ acres, is one of the largest in the world devoted exclusively to the manufacture of rivets. They are made in all sizes from ½ inch up, in any length.

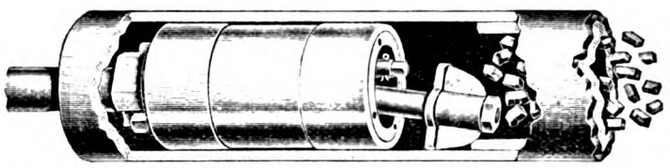
DEAN BOILER TUBE CLEANER.

A device that has come into much use and favor in dealing with the scale problem is the Dean boiler tube cleaner, manufactured by the Wm. B. Pierce Co., 325 Washington street, Buffalo, N. Y. Unlike most articles of the kind on the market, it is an engine in itself, operating a miniature hammer, the motive power of which is either steam or compressed air.

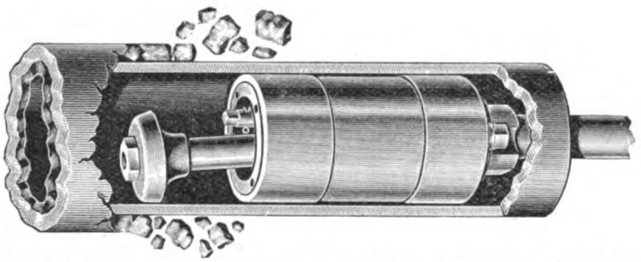
The company makes a liberal offer of furnishing one of these cleaners free to anyone who would make a test of it. It has numerous references of satisfied users to back up its guarantees.

In the accompanying cuts are shown the Dean cleaner working in a water tube boiler and also in a return tubular boiler. The sectional view explains the workings of the device.

The nozzle A, attached to a hose or gas pipe of suitable length, carries compressed air or dry steam into the valve chamber B, and thence goes alternately through the ports DD into the piston chamber E. At a pressure of from 40 to 80 pounds, the piston F moves the hammer handle G to and fro, imparting a vibrating motion to the hammer J. The handle of the hammer, being pivoted at H, works the valve C so as to cover the ports in alternation.



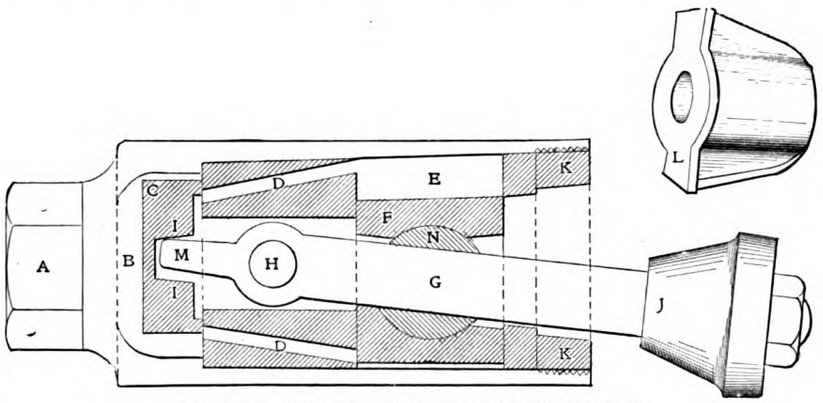
DEAN BOILER TUBE CLEANER WORKING IN TUBE OF WATER TUBE BOILER.



DEAN BOILER TUBE CLEANER WORKING IN TUBE OF RETURN TUBULAR BOILER.

The whole tool inserted in the boiler tube, the hammer vibrates from 3,000 to 5,500 times a minute, striking the tubes with very light but very frequent blows, thus jarring the scale loose and in the water tubes the rush of air, or steam, drives the loosened particles forward and out.

It is claimed that from 10 to 30



SECTIONAL VIEW OF A DEAN BOILER TUBE CLEANER.

tubes an hour can be cleaned in this way, removing every particle of scale, no matter how thick or how hard the incrustration may be.

The device, for test, and full literature explaining it, will be sent on request by the company.

MAIN VALVES ON THE STEAM ENGINE.

The steam engine cannot be called new. Therefore, the functions of the main valves should be quite well understood by those who are yet building or buying or operating the steam engine. The function of the main valve being to open the port for the freest admission of the desired quantity of steam, then to cleanly cut off this quantity from the supply and confine it in the cylinder (without leakage) that it may push on the piston to the last possible degree, then open and allow it to escape as freely and, therefore, speedily as possible, it is absolutely necessary that in order to perform these functions properly the valve must be steam tight on its seats and must remain steam tight until worn out, for, if it leaks, it simply acts upon the engine, as choking would upon a man who was trying to run up hill, increasing leakage representing a tightening grip upon the man's throat. For two reasons the valve must move without friction. First, it cannot remain steam tight if it wears itself and seats by friction, and, second, it cannot maintain its proper movements if the valve motion is under heavy strain, and worn excessively by valve friction; therefore, to have an efficient main valve it must be correctly (completely) balanced, and of a design which will maintain itself steam tight. It must also take care of any excess of water that may get into the cylinder. While this may appear very simple, it is only necessary to examine the patent records to discover that the vast amount of thought by hundreds of mechanics which has been given to the question, stamps it as a most perplexing problem: The first recorded attempt was made by J. Kirkpatrick, July 10, 1834, (73 years ago) since which time 1,000 patents issued to those who have attempted, in many ways, to produce a main valve that would move on its seat without friction, that would be and remain steam tight until worn out and that would relieve the cylinders of excess water.

Most of these thousand improved main valves never reached or got beyond the first trial, and those few which have stood the test of service have only done so imperfectly under far more favorable conditions than the present high pressures and superheated steam presents, and they fail utterly to meet these modern requirements.

One fails to find anyone of those who attempted to solve this question giving more than a few spare moments of their time to it, they all being more or less weighted with, what was to them, more important work. None of them made a special exclusive business of it, and very few ever gave it attention beyond the trial of the device they had so conceived, and, as the first of any mechanical device was never perfect, there was disappointment, and there the question rested: the cause of so many and so general failures was due to lack of continued effort in the one direction by the same individual. Like the others, the American Balance Valve Co. started in the valve business with the expectation of giving it only a part of their time, but, unlike others, did not stop with their first imperfect test, but recognized the importance of the task, and prepared to devote their entire time to its solution. They, therefore, sent to Washington, and had the entire series of main valve patents bound in six large volumes and forwarded to their office. After examining these carefully the cause of failure was clear. They kept in mind the two absolutely necessary features of perfect balance at all points in the valve's movement, and absolutely steam tight, self-adjusting packing. They found almost all sadly deficient in both of these essentials, and the remaining few either devoid of or sadly deficient in one or the other. Some few men may honestly believe (if they haven't made proper tests) that they can fit a round plug into a valve cage so it will accommodate itself to the changing temperatures and not stick nor become loose enough to leak. Others will say they can do this thing with a square or flat valve in a hole of same shape, with sometimes a means provided for adjusting the hole, such as set screws or shims, or facing of lug, etc. They convinced themselves, as most mechanics have done, that none of these propositions were worth considering as balanced steam tight valves for steam engines. They recognized, as an absolute fact, that any valve in which the combination of the packing and the valve did not automatically adjust the valve to its seat or cage, and then automatically continue this adjustment, was a poor and expensive valve.

The fact that engines have been built, are being built, and will continue to come forth with valves of poor efficiency, does not speak in favor of such valves, for it is only a question of boiler behind them to enable the engine to perform a given work for a time, but it must be noticed that they require frequent refitting in order to prevent the ever-increasing waste of steam overreaching the capacity of the boiler and seriously affecting the power of the engine. There is no investment that can be placed on an engine that will begin to give as great returns through increased efficiency of both engine and boiler as the most perfect balanced main valve obtainable, and this fact alone, is sufficient to cause every builder, purchaser or operator of a steam engine to give the question sufficient attention to insure the use of the best that is in the market.

STEERING GEAR CHAIN.

In order to give closer attention to their growing lake trade on steering-gear chain and forgings, the Jas. McKay Co., of Pittsburg, has opened a Cleveland office at 1014 Citizens building with H. D. Cushman Co. in charge, through whom their local business will in the future be transacted. For 30 years this firm has produced high grade, hand-welded, tested chains and their product is widely known and extensively used by railroads, dredgemen, vesselmen and wherever life or property is dependent on chain. They boast with pardonable pride that not a single life has been lost through defects in material or workmanship in their chain.

The safety of a modern vessel demands wheel chains of highest tested quality and for this purpose Jas. McKay Co. manufactures chain from Zug's staybolt or Ulster iron, hand welded on a coke fire and tested to meet the specifications of the United States government, Lloyds and the American Bureau Veritas. A certificate of inspection is furnished with each chain.

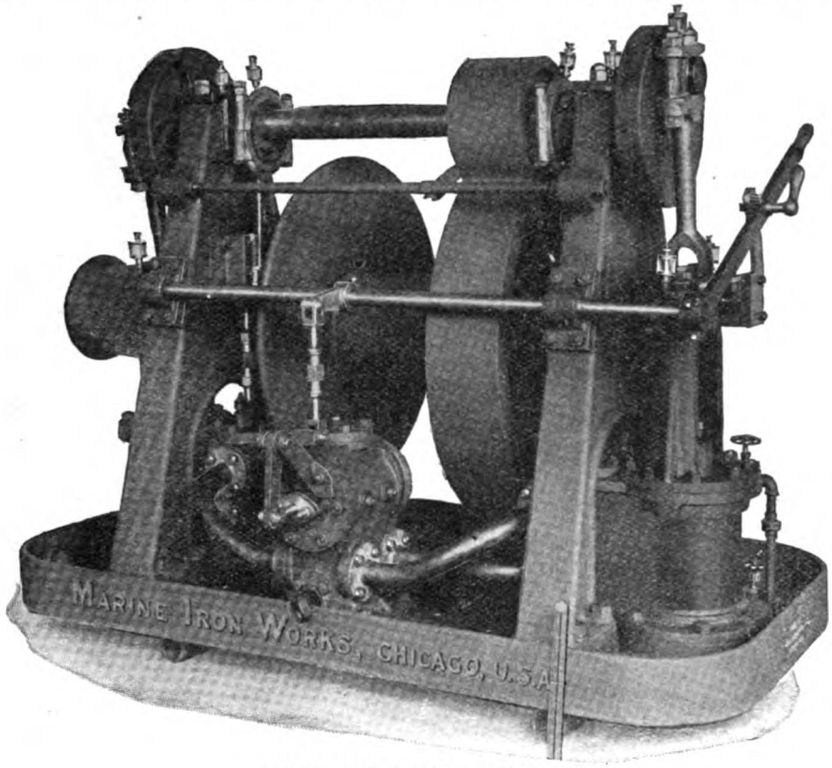
EQUIPMENT FOR REVENUE CUTTER SERVICE.

Amongst the recent orders filled for the government by the Woodhouse Chain Works, Trenton, N. J., is a 240-fathom cable for revenue cutter No. 14, now building at the yard of Pusey & Jones, Wilmington, Del. The chain is of studded-link type, 1 9-16 in. diameter, and under breaking test withstood an actual strain of 139,790 lbs.; the test being certified to by the assistant engineer of the revenue cutter service. The Woodhouse Chain Co., is now filling an order for a cable of similar type, also for the revenue cutter service, of 1¼ in. diameter and 249 fathoms in length.

The Wilgus Mfg. Co., corner Boyd and Wall streets, Los Angeles, Cal., have just put out little circulars descriptive of their oil burning machinery and appliances for burning oil.

MARINE IRON WORKS CARGO HOISTS.

It would be difficult to devise a handier or more compact steam winch than the one here illustrated, a number of which have been built this season by the Marine Iron Works, Chicago, mostly for Pacific coast vessels. These hoists or winches are made exceptionally strong and intended for hard usage; are always ready for work, easily operated and being under perfect control by the lever to the steam reverse cylinder, are not complicated by the addition of a brake.

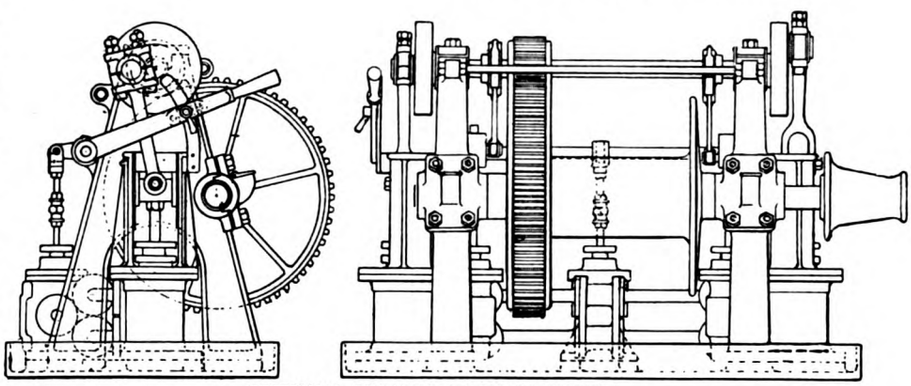


MARINE IRON WORKS CARGO HOIST.

Their double engines (usually 7 x 8) are fitted with balanced piston valves and reverse cyinder with the same kind of valve. The connecting pipes between cylinders are heavy gage copper with substantial brass flanges, forged connections, steel and semi-steel "herring-bone" gears and a stout shield. The drum shaft is ground to 4 in. and the engine shaft to 3 in. diameter. The fittings for each hoist include lubricator, oil cups and wrenches. A good job all the way through—second to none. They are usually made and sold in pairs—right and left.

Each of these hoists occupies a deck space of 38 in. by 75 in.; extreme width over warping drum 7 ft. 3 in.; extreme height 4½ ft.; weight each, 5,400 lbs. They are built to order only.

The Marine Iron Works, Chicago, also build a smaller size steam hoist of similar design which are very useful on the small and medium size commercial boats and are suitable for wharfing, raising anchor, hoisting cargo and other miscellaneous duty which the small vessels referred to are so often called on to do.



SECTIONAL DRAWING OF SMALL HOIST.

Steel is used in the construction of these hoists to a greater extent than usual on such work in order to insure strength and wearing qualities within reasonable weight and space limitations.

WATERPROOF CANVAS.

With the sudden arrival of what is going to prove a long and severe winter, the question of providing reliable tarpaulin and other covering as part of the ship equipment, should interest the owner and master to no little extent. The day of the painted hatch covering, with its cracked and leaking skin, has almost passed away, and waterproof canvas is now used extensively in the construction of tarpaulins, hatch and boat covers, and the like.

It is only in the last few years that absolutely reliable waterproof canvas has been manufactured, and the uses to which such a canvas can be applied aboardship and around freight wharfs are numerous. Wilford's waterproof cloth, of which Edward A. Bunker, New York, is sole agent for the United States and Canada, is made of pure twisted flax thread, and has proven itself singularly adapted to rough usage and exposure. It is much stronger and more durable than cotton, and, unlike many of the so-called waterproof canvases, is of light weight and easily handled.

The fact that such concerns as the Standard Oil Co., the Bush Terminal Co., the Central Railroad of New Jersey, and other large corporations, in addition to many of the shipping companies, have adopted the Wilford waterproof canvas, speaks for the merits of the article. Amongst recent orders filled for this waterproof canvas may be mentioned six large covers made by Louis Martin, sailmaker of New York, for Pennsylvania railroad lighters.

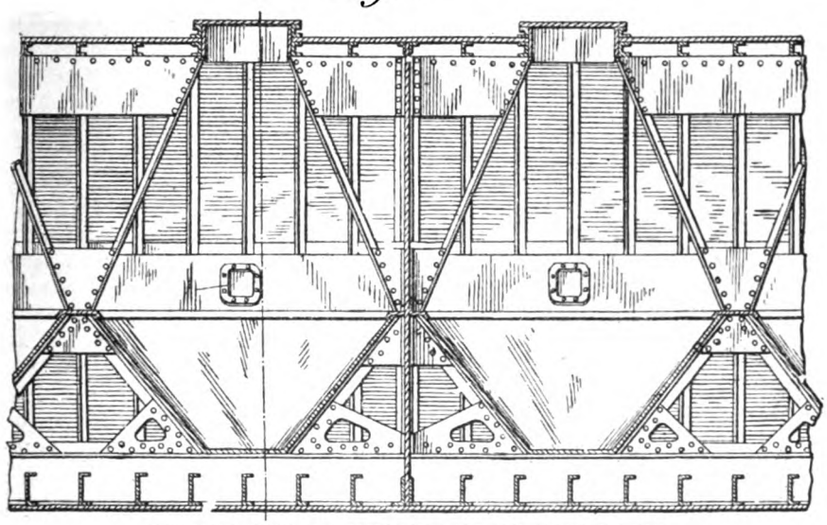
CONSTRUCTION WORK.

Specifications have been issued by the bureau of yards and docks of the navy department inviting bids for the completion of the dry dock at Brooklyn, N. Y., the contract for which was recently forfeited by Secretary Metcalf, owing to the failure of the contractor to finish the work. About $800,000 is available.

MAYTHAM'S HOPPER BOTTOM BOAT.

In the accompanying illustrations are given the designs for a new type of hopper bottom vessel, that, because of its economy, safety and strength, is expected to work a decided change in the construction of grain, ore and coal handling freighters. This vessel, which was designed by George W. Maytham, of the well-known family of lake transportation men of Buffalo, is shortly to be built and paced in service on the great lakes.

Fig. 5.



SECTIONAL VIEW OF MAYTHAM HOPPER BOTTOM BOAT.

Among the advantages claimed for it are that it will be more economical than the present type of freighter, owing to the saving in time and labor effected in unloading; that it will prevent shifting of cargo; make a stronger and more seaworthy vessel, being practically unsinkable, the construction being equivalent to having collision bulheads; all resulting in a material reduction in hull and cargo insurance rates.

The hold of the vessel, instead of being one long compartment or a series of square spaces separated by bulkheads, is comprised of any desired number of hopper bottom compartments, each separate from the other anl extending the width of the ship. Their bottoms are 3 ft. lower than that of the hold of the present style of freighter, so there is no sacrifice in space. There can be no loss in the shipment of grain from wetting of cargo and as many different consignments can be carried as there are hoppers. The hopper system also permits the shipping of different grades of the same material in one cargo.

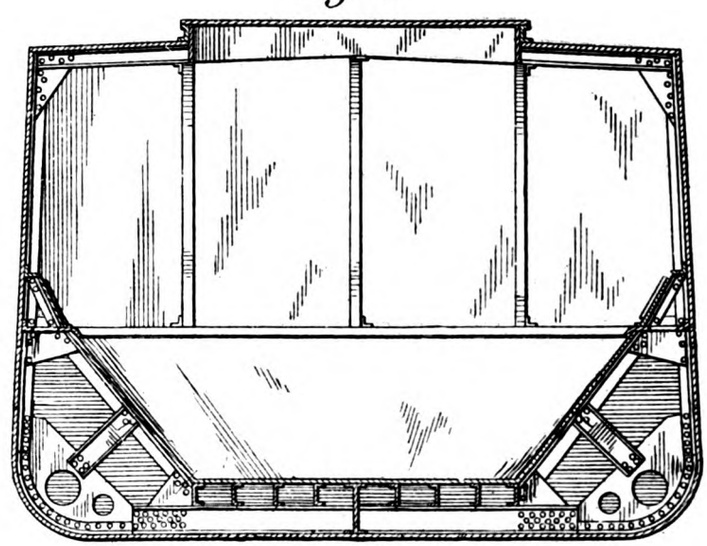
A new system of bracing is introduced by virtue of the peculiar construction required by the hopper compartments, which will render the vessel very rigid and make it practically free from vibration, or weaving. These braces consist of diagonal cross trusses supporting the deck and being an element in stiffening the construction fore and aft. Fewer hatches will be required and those used will be 24 ft. centers.

Such provision is made for water ballast in the spaces between the bottoms of the various hoppers and the sides of the vessel as will enable it to go light in any kind of weather, the ballast being bulkheaded to prevent shifting.

The one great advantage represented, however, is that the vessel can be unloaded much easier than the old style, as the sloping sides of the hoppers cause the load to seek the center of the bottom of each hopper, automatically trimming the vessel and keeping its freight exactly where the elevator leg or clam shell can reach it. This not only dispenses with a great deal of manual labor, but, as in the case of coal, obviates the necessity of shoveling.

The success of the hopper system is assured, it having already been favorably demonstrated in actual trial, where only two sloping sides have been used. The unanimous opinion of those who have been consulted is that the vessel will be one of strength, dispatch and economy. The idea is protected by patents in the United States and foreign countries and the rights held by the Automatic Transfer Co., Buffalo, N. Y.

Fig. 6.



CROSS SECTION OF MAYTHAM'S HOPPER BOTTOM BOAT.

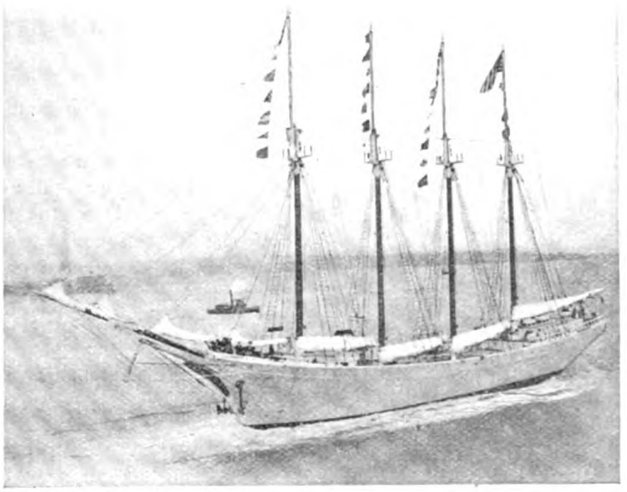
HOISTING SAILS BY GASOLINE POWER.

It may not be generally known that gasoline power is already used extensively in the place of steam on vessels for hoisting sails, anchor and cargo, also for pumping water, but this is true of many vessels engaged in the Atlantic coasting trade.

In many cases it has been difficult to obtain crews on vessels worked by hand power, which has led the owner to install gasoline power, because it was cheaper than steam and would do the work just as well.

Further, the invention of Gray's patent windlass attachment made it possible to connect power to any style

of windlass either old or new, which was not possible with steam; thus, one more field of usefulness has been added to the sphere of gasoline engines. It had been used for several years for propelling small boats, but it remains for the Mianus Motor Works, Mianus, Conn., to first introduce it for hoisting purposes on vessels.



SCHOONER DEAN E. BROWN WHOSE SAILS ARE HOISTED BY GASOLINE POWER.

They installed the first gasoline hoisting gear on the schooner John L. Treat in the year 1902. The John L. Treat was an old vessel and at first gasoline power was not connected with the windlass. As the windlass shaft was not long enough to attach a gear it was some time before a suitable means was found for operating the windlass. This led to the invention of the crank windlass attachment by George Gray of the Mianus Motor Works. This attachment is so constructed that it can be used on any kind of windlass, even the old fashioned kind made of wood.

Captain Gilmore of the schooner John L. Treat was so well pleased with the outfit that he recommended it to others and soon several vessels were equipped wih gasoline power, and up to the present time The Mianus Motor Works have equipped two or three hundred vessels with this power.

Some of the advantages of gasoline over steam are as follows:

It occupies less space as there is no boiler or coal bin to provide for.

The first cost of the outfit is less and it costs less to install it.

The cost of operating is much less, owing to the fact that no licensed engineer is required and any intelligent man can soon learn to run it.

Further, there is no expense for fuel only while the engine is running.

No stand-by losses like steam where a fire has to be kept under the boiler all the while in order to have it available.

Full power can be had in from one to two minutes.

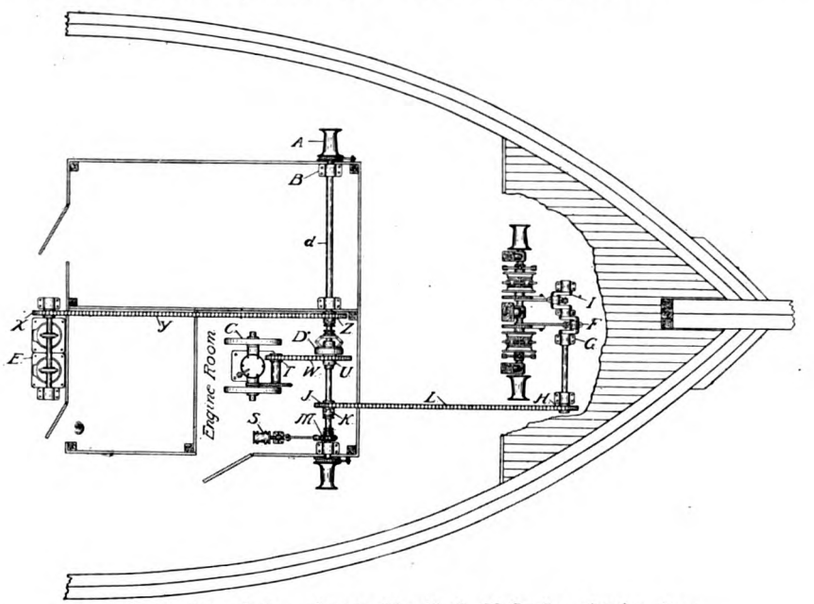
Power is transmitted by means of a friction clutch, this in connection with a throttle for regulating the speed makes the power just as flexible as steam.

Many new vessels of the largest size are now equipped with gasoline power.

The following vessels are now rereceiving their equipments: Schooner Dean E. Brown, 1,200 tons, owners, Benedict Manson Marine Co., New Haven, Conn.; schooner Marjorie A. Spencer, 421 tons, owners E. C. Ryder, Bangor, Me.; schooner John R. Penrose, 455 tons, owner Thos. Winsmore, Philadelphia, Pa.; ship Rhine, 3,000 tons, (English); schooner Thos. Winsmore, 435 tons, owner Thos. Winsmore, Philadelphia, Pa.; schooner Geo. Taulane Jr., 465 tons, owner, Thos. Winsmore, Philadelphia, Pa.

REILLY MULTICOIL FEED WATER HEATER.

Of recent years engineers and architects have been giving more attention to the matter of steam plant economy, and the subject of pre-heating the feed water to the boilers has been found to be one of the most important factors in economy and fuel saving. It is well known to engineers that if the temperature of the feed water is raised before it enters the boiler, the work necessary to be done in the boiler by the coal burned under it is reduced in proportion, and the result is that each degree increase in temperature of the feed water will result in a saving of fuel of from 1-10 to 1-11 of one per cent.



Deck plan of the schooner Harold J. McCarthy, showing location of gasoline engine C, which is connected to main shaft D by sprocket and chain. The Gray Patent Windlass attachment F is driven from main shaft D by messenger chain L. Two pumps E are also driven from main shaft D. The small deck pump S is driven direct from main shaft.

In most plants there is a sufficient supply of exhaust steam at atmospheric pressure, or a few pounds above, to heat the water to from 210 to 230 degrees. In case the auxiliary

steam—the heat represented in which is pure waste unless utilized in a feed water heater or for other purposes—is insufficient to heat the water to the desired temperature, it is advisable to supplement this auxiliary supply by steam taken from the low pressure receiver, inasmuch that the work the steam might do in the low pressure cylinder is very much less than the useful work that may be got out of it by allowing it to condense in, and give up its heat to, a feed water heater.

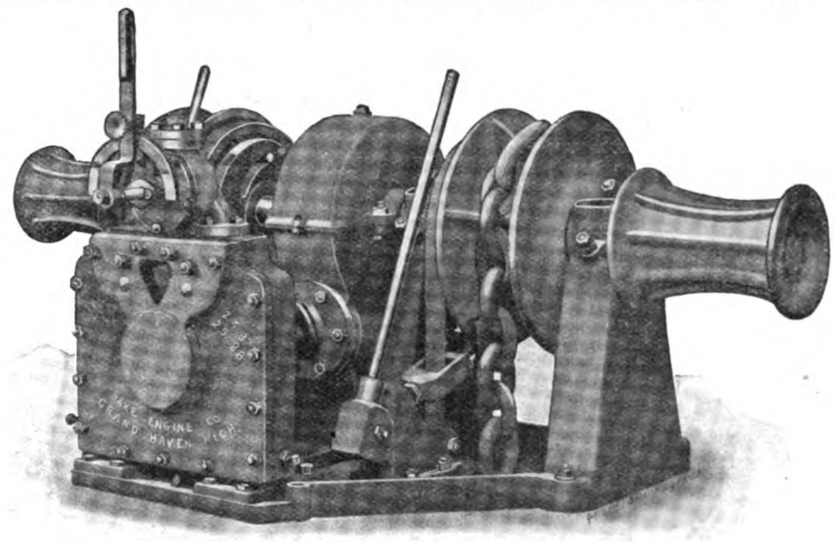
When an engineer or superintendent can be shown that reliable feed water heater will be a source of actual saving to the extent of ten per cent to 15 per cent of his coal bill, and that expenses will be correspondingly reduced in other directions, he is inclined to give the matter of installing such a heater in the plant or plants in his charge serious consideration.

The Griscom-Spencer Company, who manufacture the Reilly multicoil feed water heater for both marine and stationary uses, has given a great deal of attention to the scientific study of feed water heating, and, as a result, have perfected the construction and design of their heater and accumulated a large amount of data on steam plant operation and economy that places them in a position to be valuable advisers on this subject. In this study their attention has also been brought to the many requirements that make for a good heater, enabling them to embody in their Reilly feed water heater the experience gained from this source and also their long experience as manufacturers.

In the construction of the Reilly feed water heater, great care has been exercised to provide a heater combining with great efficiency accessibility for inspection or overhaul. Engineers can appreciate the advantage of a compact heater of this type, as in the limited accommodation of an engine room the overhauling or repairing of a large and cumbersome heater, installed very often in cramped quarters, is no light task. Access can be gained to every internal part of the Reilly multicoil heater without the necessity of breaking any pipe connections, and the coils are so arranged as to be easy of renewal in case of accident. The Griscom-Spencer Co. are at all times glad to discuss with engineers the particular conditions that may be met in a specific plant and advise accordingly.

ANCHOR WINDLASS.

The accompanying cut shows a new anchor windlass which the Dake Engine Co. of Grand Haven, Mich., has recently brought out, and it is pronounced to be a very superior machine for steamboat work. They make them in two sizes, and either make them with or without the capstan attachment for upper deck. The engine is attached to the windlass by means of a worm and the worm-wheel, and back geared 1 to 2, which decreases their speed and gives them great power. It would be well to get their prices and description of this rig as the windlass is spoken of very highly on account of its strength, durability and simplicity in handling.



NEW DAKE ANCHOR WINDLASS.

ANOTHER MANUFACTURER OF BIG GAS ENGINES.

As an indication of the rapid development in the manufacture of big gas engines and the importance of the field occupied by this type of prime mover, it is of interest to note that another manufacturer of large Corliss steam engines has actively taken up the manufacture of gas engines and is bidding strongly for engines in medium and large sizes.

The Wisconsin Engine Co., with its works at Corliss, Wis., which has built some very large and successful Corliss steam engines, is building gas engines for all services in sizes from 400 B. H. P. to 5,000 B. H. P. The engines utilize natural gas, producer gas, coke-oven gas or blast-furnace gas in the Otto cycle (4-cycle), and are of the horizontal tandem and twin-tandem double-acting type. This company controls the Sargent patents on internal combustion engines and has employed Charles E. Sargent as the engineer of its gas engine department. Mr. Sargent has a wide reputation as an engineer and in 1898 designed, it is claimed, the first horizontal tandem double-acting gas engine, which was a wide departure from the accepted practice of those days, when the most prominent manufacturers of gas engines declared such a type was impracticable, and doomed to failure. However, the largest and most successful gas engines are of the horizontal twin-tandem double-acting 4-cycle type, and with one exception this is the only type in which large units are being built in this country.

The gas engines built by the Wisconsin Engine Co. bear some of the distinctive features of their big Corliss engines, and utilize in design most of the Sargent patents. The design is remarkably simple and embodies features which are of considerable interest to the engineer and power user, e. g., there is but one poppet valve for each explosion chamber, and as this is located on the bottom of the cylinder the cumbersome and unsightly air and gas pipes, as well as the stairs, galleries and railings found on most horizontal tandem engines, are entirely eliminated; provision is made for preventing the dangerous pressures caused by possible pre-ignitions; and the engines are started automatically.

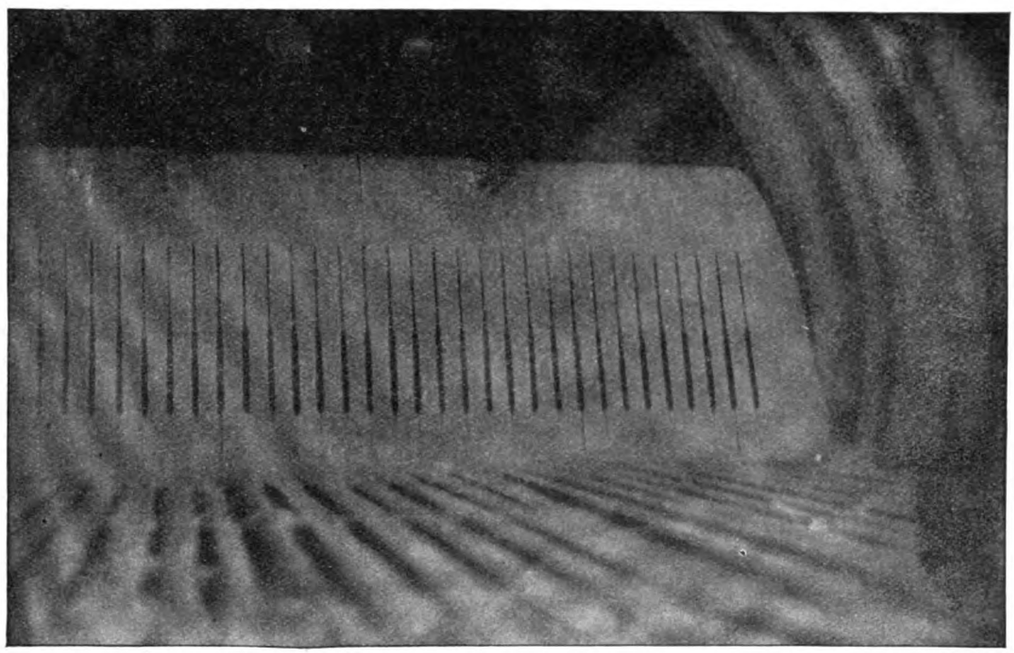
Tests of even small Sargent engines show a heat consumption of less than 9,000 British thermal units per brake horsepower-hour.

This company has recently shipped some large steam engines to such concerns as the Illinois Steel Co., Jones & Laughlin Steel Co., Packard Motor Car Co., American Sheet & Tin Plate Co.,

Amoskeeg Mfg. Co., New Hampshire Spinning Mills, National Tube Co., City of Milwaukee, Carnegie Steel Co., American Woolen Co., United States Envelope Co. and the Carnegie Natural Gas Co., and has built up an unusual reputation for shipping on time. It promises to do as well as gas engine orders.

IMPROVEMENTS IN FURNACE BRIDGE WALL.

The accompanying illustration is an interesting photograph of the inside of a furnace of a Scotch boiler fitted with the Sturrock patent cast iron bridge walls, after the same has been in use for seven months. The photograph shows plainly the effect of the fire upon the grates while the bridge wall is apparently perfectly smooth and shows no burning or other deterioration due to the action of the fire.



INSIDE OF A FURNACE OF A SCOTCH BOILER FITTED WITH THE PATENT CAST IRON BRIDGE WALLS.

This type of bridge wall has been very largely adopted by steamship companies of Great Britain, France and Germany and other European countries and is in use in over 40 steamers on the great lakes, and is now being fitted in several of the new steamers for the United States Light House Board.

This bridge wall is entirely of cast iron, composed of bars so arranged that air from the ash pits is admitted freely all around them(and becoming heated in its passage between the bars escapes through openings at the top of the bridge wall, mingling with the gases escaping from the fuel in the furnace, and so effecting their perfect combustion and largely reducing the formation of smoke. The effect of this circulation of air is such that the bars are kept cool and will not warp, twist or burn out, and no clinker ever adheres to them. All engineers are familiar with the trouble caused by clinkers adhering to brick bridge walls, which cannot be removed without pulling away more or less of the brickwork, which thus requires to be rebuilt several times in a season. These troubles are all eliminated by the use of the Sturrock bridge wall. The bars are so secured that they cannot get out of place while in use, but when necessary to make examinations or repairs can all be easily removed and can again be replaced without requiring any repairs or renewals.

These bridge walls have now been in practically continuous use for over four years in ocean steamers without requiring any renewals whatever.

They were first introduced on the lakes in the beginning of the season of 1904 and each winter since then the number of steamers being equipped with them has steadily increased.

Alexander Hynd, of the firm of Nacey & Hynd, 209 Western Reserve building, Cleveland, is the agent for the Sturrock bridge wall on the great lakes, from whom all particulars can be obtained.

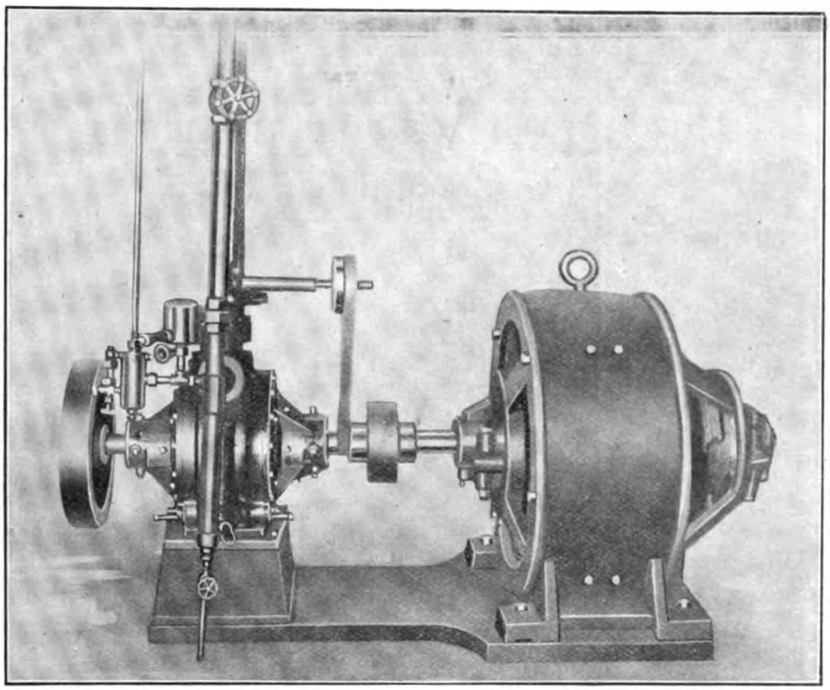
A new marine ways is being constructed at Everett, Wash., which will be managed by Charles W. Durham, an experienced ship carpenter.

ROTARY STEAM ENGINE.

B. F. Augustine, of Buffalo, has for the past 15 years been engaged in inventing and designing rotary steam engines. The engine herein described is the result of his experience. This engine, in design, proportions and workmanship, will furnish, under the most exacting conditions, satisfactory and reliable power. Its distinguishing features are steam-tight cylinders, perfectly balanced pistons, great economy of steam, perfectly balanced valve rings, great economy of space, absolutely no vibration. It is now in service at the Lafayette hotel, Buffalo, operating fans.

The engine has but four moving parts. These parts are all perfectly balanced, so that there is absolutely no friction. It will be seen that this engine has a perfectly balanced valve. The valve is composed of two annular rings, which remain stationary in the inner surface of the heads of the cylinder. These rings have parts which are direct from the steam chest. These rings, by placing one in each head, with adjustments back of them, create a perfect balance on the core. The revolving core has disks on each end with ports so that, as the core revolves, the ports in the disc come in contact with those in the valve ring, and steam is admitted to the cylinder, and, as they pass it, is cut off and expands until the next port comes in contact.

The rotary piston carrier and core arranged in the cylinder and keyed



AUGUSTINE ROTARY STEAM ENGINE DIRECT-COUPLED TO 15-H. P. MOTOR AT NO. 132 NORTHAMPTON ST., BUFFALO.

to the power shaft to rotate there with the core extends from head to head of the cylinder and has circular end flanges which form a running joint with the cylinder and straddle the abutment, which is reduced to its ends for this purpose. The core is constructed so as to enable the pistons and counterbalancing weights to operate with absolutely no friction. The cylinder has an annular exhaust chamber which acts as a superheater, so the heat units are much greater. The cylinder forms an abutment in one side, so as to form a stationary cylinder head. This abutment has by-passes so as to relieve the piston, which is in contact with the abutment, of its friction. When the piston reaches the end of the by-pass, the ports in the disc open and admit the steam to the cylinder. The piston is then locked steam-tight until the next piston reaches the end of the by-pass. The first piston then starts to exhaust through a series of ports which relieve the piston of all the exhaust before it has to slide in the core. The piston has a guide in its outer end and a counterbalance on the opposite side of the shaft, so when the engine is in motion the piston is properly balanced.

This engine has but two bearings. These bearings are made with adjustments so as to take up any wear and also to keep the revolving core tight on the abutment so as to prevent any leaking of steam. There are but two adjustments necessary to take up the wear—the journals and the valve rings—which are easily adjusted.

The engine is reversible and has not one ounce of back pressure; also has steam-tight cylinders and the frictional wear increases tightness of all joints. The engine is so arranged that if it stops on center by opening throttle by-pass, the engine will start at any point in either direction. It is also constructed to run with a vacuum, which will show greater economy. Free from vibration, all moving parts, being immersed in steam, are self-lubricating, which greatly reduces the amount of oil required and insures a perfect distribution of it to all the parts, preventing the possibility of dry surface and relieving the attendant of all care except to fill the oil cup attached to the steam pipe and one placed on each journal. This is in marked contrast to the usual necessary watchful care of the numerous oiling devices to be seen upon all other modern steam engines.

This item of cost is almost wholly eliminated, there being no shock to be absorbed or overcome and no vibration, the bed plate, being of ample size, forms about all the foundation required.

Its many important advantages on board ship for operating steering gear, steam capstans, windlasses, hoisting machines, dynamos for electric lighting, ventilating fans, circulating pumps, bilge pumps, and many other devices so commonly employed on a steamboat, by the use of the engine, where direct coupling is made, the cost of belts, extra shafts, countershafts with their pulleys and bearings, can be saved as well as the slip, friction and consequent loss of power which their use involves; and thus there is greater saving of floor space by using this engine for elevator purposes; fully 75 per cent can be saved on the installation and fully 50 per cent on operating. The hydraulic elevator requires as much power for one person as it does for a dozen. This engine, if taking one person will only require steam for that amount of work. The engine will operate with steam from one pound up to as high a pressure as a modern boiler can stand.

Quite a number of prominent Buffalo men are interested in the engine.

ROGERS BOILER PURIFIER.

The Rogers' combination steam boiler heater, purifier, oil separator and circulating device is meeting with great success. The operation of the purifier adds greatly to the life of the boiler and is a decided enemy of scale. Scotch boilers have been run successfully in the marine service for six months without cleaning, and in fact at the end of that period have been found to be practically as clean as when put into service. The company has received a great many gratuitous testimonials of the efficiency of the device. Two Scotch boilers equipped with Rogers device at the yard of the Buffalo Dry Dock Co. have been running for three months without being cleaned and also two at the Ship Owners' Dry Dock Co., Chicago. A battery of Babcock & Wilcox water-tube boilers have been running for two years at the power house of the Chicago City Railway Co., cleaning out every six months. Numerous other instances could be given of the excellent work of this device. The headquarters of the Rogers company are Room 12, 202 Main street, Buffalo, N. Y.

The annual entertainment and ball of Marine Engineers Beneficial Association No. 33, New York, was held in Lexington avenue opera house in the evening of Dec. 4. The gathering was generally agreed to be the most successful in the history of No. 33, the committee of arrangements being more than satisfied with the large attendance of members and guests. An excellent variety program was provided, the dance following the close of the entertainment.

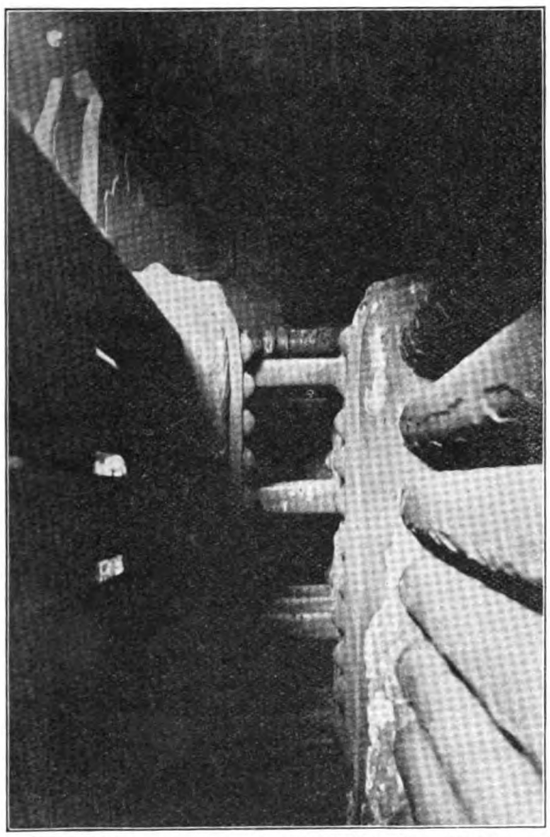
ADVERTISERS

The Star indicates alternate insertions, the Dagger once a month.

Power 4 Months Without Cleaning Boilers

WITH THE

Rogers' Combination Steam Boiler Heater, Purifier Oil Separator and Circulating Device



Scale leaving the sheets of an old boiler after 3 months service of Rogers Purifiers.

We have successfully run Scotch boilers in marine service six months without taking them out of commission, or cleaning. At the end of this period they were practically as clean as new—only a small pail of sand found in the bottom of the boiler.

Rogers' Purifiers were installed in boilers seven and eight years old. After three months we opened to clean and found the plates stripped of from 4 to 5½ bushels of old scale, leaving the sheets entirely bare, as shown by this photograph. Three months previous the whole surface was coated as shown in the lower part of cut.

This We Claim

1. Heats the feed water.
2. Purifies the feed-water by removing foreign substances.
3. Separates the oils and greases from the feed-water.
4. Discharges the feed-water at the bottom of Scotch and marine boilers, thus causing a circulation and bringing the temperature very close—bottom and top—the action of the fire being much above the bottom of the boiler.
5. Dispenses with unequal expansion and contraction to the greatest extent, thus eliminating large boiler repairs, leaky girt seams, furnaces, front and back-head seams, and deterioration of shells.
6. Cheapest and easiest to operate.
7. As efficient as any on the market.
8. Absolutely safe and purely mechanical.
9. Will prevent pitting.
10. No radiation or loss of power in connection with our device.

These Users Substantiate Our Claims

Steamers

Tuscarora
Bethlehem
Lighter Batavia
Gratwick
Northern Star
Northern Light
Minneapolis
Huron
Abraham Stearns
Henry B. Hawgood
Northland
Green
F. C. Ball
Castalia
Cillah
Ed. Smith
Heber Ward
City of Buffalo
Saranac
Wilkesbarre
P. P. Miller
Grecian
Northern King
North Wind
St. Paul
Chas. Hebard
Henry B. Smith
Neff
Hugh Kennedy
No. 30 at G. L. E. W.
L. C. Hanna
Myron
Buffalo (W. T. Co.)
Seneca
Mauch Chunk
Clyde
Corsica
Northern Queen
North Wave
Wm. Castle Rhodes
Capt. Thomas Wilson
J. Q. Riddle
Northwest
Stafford
Northwestern, N. Y.
Wm. B. Davock
Yale
Bradley
Mathew Andrews
Manteo
City of Erie
Sheldon Parks

New Steamers

American S. B. Co.
Hull No. 174
Hull No. 156
Hull No. 626
Hull No. 441
Hull No. 357
Hull No. 521
Hull No. 74
Hull No. 75
Hull No. 76
Hull No. 176
Great Lakes E. W.
Hull No. 31
Hull No 32
Hull No. 33
Hull No. 36
Hull No. 37
Hull No. 39
Hull No. 40
Hull No. 41
Hull No. 42
Hull No. 43
Toledo Ship Bldg. Co.
Hull No. 111
New York S. B. Co.
Camden, N. J.
3 Boilers No. 53
Newport News S.B.Co.
Tug Ganoga at N. Y.
Tug Mahanoy at N.Y.

In addition to the above list we have two Scotch boilers equipped with Rogers' device at the Buffalo Dry Dock Company, running three months without cleaning out—two at the Shipowners' Dry Dock Company, Chicago—Babcock & Wilcox boilers now running two years and cleaning out every six months at the Chicago City Railway Company, Chicago—Babcock & Wilcox boilers cleaning every two months at the Heubner Brewery Company, Toledo—Babcock & Wilcox boilers at the Fidelity Trust Building, Buffalo, running three months—tubular boilers at the Pfeiffer Boiler Company, Chicago, running six months—tubular boilers at the LeRoy Salt Works, LeRoy, N. Y., running two months—two Scotch boilers at Larimore, N. D., plant of the Great Northern Railroad Company.

Positively no failures to date. *Write for circulars of information.*

Rogers, 202 Main St., Buffalo, N. Y.

BUYERS' DIRECTORY

Advertisements can be found readily by reference to the Alphabetical Index.

AIR COMPRESSION, HOISTS.

Great Lakes Engineering Works.. .....Detroit.

AIR PUMPS AND APPLIANCES.

Fore River Ship & Engine Co..... ..... Quincy, Mass.
Great Lakes Engineering Works... ..... Detroit.

ANCHORS.

Admiral Anchor Co.....Chester, Pa.
Bowers, L. M. & Co..... ..... Binghamton, N. Y.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons...Philadelphia.

ANTI-RUST COATINGS.

Hardy Paint & Varnish Co..... .....Toledo, O.

ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co..... ..... Cleveland.
Detroit Ship Building Co...Detroit.
Great Lakes Engineering Works... ..... Detroit.

ASH EJECTORS.

Great Lake Engineering Works.... ..... Detroit.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

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Goulder, Holding & Masten..... ..... Cleveland.
Hoyt, Dustin & Kelley...Cleveland.
Jenkins, Russell & Eichelberger.... ..... Cleveland.
Kremer, C. E.....Chicago.
MacDonald, Ray G.....Chicago.
Marshall, Alexander..Duluth, Minn.
Shaw, Warren, Cady & Oakes..... ..... Detroit.

BAROMETERS, MARINE GLASSES, ETC.

Ritchie, E. S. & Sons..... .....Brookline, Mass.

BLOCKS, SHEAVES, ETC.

Boston Lockport Block Co..... ..... Boston, Mass.

BOAT BUILDERS.

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Truscott Boat Mfg. Co..... .....St. Joseph, Mich.

BOILER COMPOUNDS.

Bird-Archer Co.....New York.
Dearborn Drug & Chemical Works. ..... Chicago.
Indianapolis Chemical Co..... .....Indianapolis, Ind.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co..... ..... Providence, R. I.
American Ship Building Co..... ..... Cleveland.
Atlantic Works..East Boston, Mass.
Briggs, Marvin.....New York.
Chicago Ship Building Co..Chicago.
Cramp, Wm. & Sons..Philadelphia.
Delany, P. & Co...Newburgh, N. Y.
Detroit Ship Building Co..Detroit.
Fletcher, W. A. & Co..... .....Hoboken, N. J.
Fore River Shipbuilding Co..... .....Quincy, Mass.
Great Lakes Engineering Works... ..... Detroit.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
Maryland Steel Co..... .....Sparrow's Point, Md.
Manistee Iron Works Co..... .....Manistee, Mich.
Marine Iron Works.....Chicago.
Milwaukee Dry Dock Co..... ..... Milwaukee.
New York Shipbuilding Co..... .....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.
Port Huron Construction Co..... .....Port Huron, Mich.
Quintard Iron Works Co..... .....New York.
Roberts Safety Water Tube Boiler Co..... New York.
Superior Ship Building Co..... .....Superior, Wis.
Toledo Ship Building Co....Toledo.

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Falls Hollow Staybolt Co..... .....Cuyahoga Falls, O.

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Upson-Walton Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co..... .....Providence, R. I.
Dake Engine Co..... .....Grand Haven, Mich.
Hyde Windlass Co.....Bath, Me.
Marine Iron Wks.....Chicago, Ill.

CEMENT, IRON FOR REPAIRING LEAKS.

Smooth-On Mfg. Co..... .....Jersey City, N. J.

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General Electric Co..... .....Schenectady, N. Y.

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Seneca Chain Co.....Kent, O.
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Pittsburg Coal Co.....Cleveland.

COAL AND ORE HANDLING MACHINERY.

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Dunbar & Sullivan Dredging Co.... .....Buffalo.
Great Lakes Dredge & Dock Co.... ..... Chicago.
Levine, A. & Co.....Cleveland.

Buyers' Directory of the Marine Trade---*Continued.*

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Sullivan, M. .....Buffalo.

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Buffalo Ship Chandlery & Supply Co. .....Buffalo.
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Upson-Walton Co.....Cleveland.

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CRANES, TRAVELING.

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Schrader's Son, Inc., A...New York.

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Dunbar & Sullivan Dredging Co.... .....Buffalo.
Great Lakes Dredge & Dock Co.... ..... Chicago.
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Starke Dredge & Dock Co., C. H... ..... Milwaukee.
Sullivan, M.....Buffalo.

DREDGING MACHINERY.

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Superior Iron Works..Superior, Wis.

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Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co., Chicago.
Cramp, Wm. & Sons...Philadelphia.
Detroit Ship Building Co....Detroit.
Great Lakes Engineering Works... .....Detroit.
Lockwood Mfg. Co..... .....East Boston, Mass.
Manitowoc Dry Dock Co..... .....Manitowoc, Wis.
Milwaukee Dry Dock Co..... ..... Milwaukee.
Newport News Ship Building Co.... .....Newport News, Va.
Superior Ship Building Co..... .....Superior, Wis.
Tietjen & Lang Dry Dock Co..... .....Hoboken, N. J.
Toledo Ship Building Co....Toledo.

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Chase Machine Co.....Cleveland.
Cramp, Wm. & Sons...Philadelphia.
Detroit Ship Building Co., Detroit.
Fletcher, W. & A. Co..... .....Hoboken, N. J.
Fore River Shipbuilding Co..... .....Quincy, Mass.
Gillett & Eaton....Lake City, Mich.
Great Lakes Engineering Works... .....Detroit, Mich.
Hall Bros. .....Philadelphia.
Lockwood Mfg. Co..... .....East Boston, Mass.
Manitowoc Dry Dock Co..... .....Manitowoc, Wis.
Marine Iron Wks. .....Chicago, Ill.
Maryland Steel Co..... .....Sparrows Point, Md.
Manistee Iron Works Co..... .....Manistee, Mich.
Milwaukee Dry Dock Co..... .....Milwaukee.
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Smith, Stanley B. & Co.....Detroit.
Toledo Fuel Company....Toledo, O.

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GAGES, WATER.

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Lane Tool Co.....Cleveland.

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Chase Machine Co.....Cleveland.
Dake Engine Co..... .....Grand Haven, Mich.
General Electric Co.....New York.
Hyde Windlass Co.....Bath, Me.
Marine Iron Co.....Bay City.